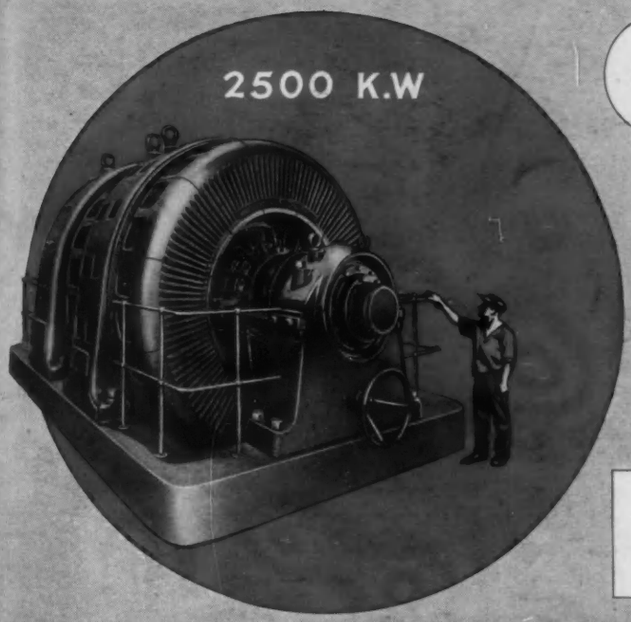
June 1930

Electrical Manufacturing

Vol. 5 A Gage Publication No. 6



GIANT

A 2500 K. W. Rotary Converter,
with Precision Roller Bearings.

or

A 1/10 watt Tone Alternator,
with Precision Ball Bearings.

PIGMY

PRECISION BEARINGS

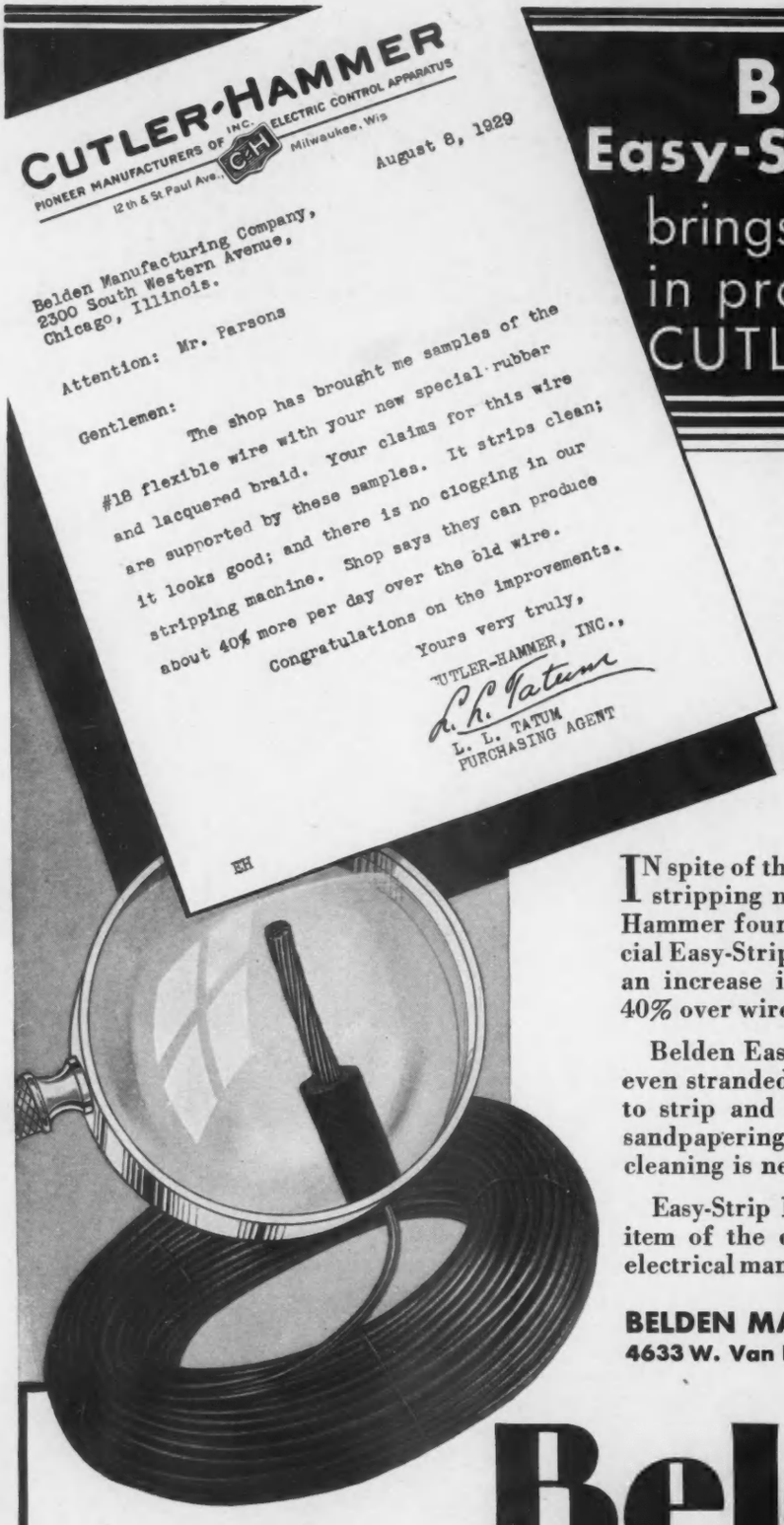
Better bearings for better performance—over the entire range of loads, speeds and duties.

Let us send the Catalogs.
May our engineers be of service to you?

"NORMA-HOFFMANN"
PRECISION BEARINGS

NORMA-HOFFMANN BEARINGS CORPN.-STAMFORD CONN. U.S.A.

Belden Easy-Strip Rubber brings 40% increase in production, says CUTLER-HAMMER


CUTLER-HAMMER
PIONEER MANUFACTURERS OF ELECTRIC CONTROL APPARATUS
12th & St. Paul Ave., Milwaukee, Wis.
August 8, 1929
Belden Manufacturing Company,
2300 South Western Avenue,
Chicago, Illinois.
Attention: Mr. Parsons
Gentlemen:
The shop has brought me samples of the #18 flexible wire with your new special rubber and lacquered braid. Your claims for this wire are supported by these samples. It strips clean; it looks good; and there is no clogging in our stripping machine. Shop says they can produce about 40% more per day over the old wire.
Congratulations on the improvements.
Yours very truly,
CUTLER-HAMMER, INC.,
L. L. TATUM
PURCHASING AGENT
EH

« « The experience of Cutler-Hammer, outlined in the accompanying letter, is typical of the experience of other manufacturers who have taken advantage of the time-saving economy provided by Belden Wire with Easy-Strip Rubber Insulation.

IN spite of the fact that they have the best wire stripping machines that can be made, Cutler-Hammer found that Belden Wire with the special Easy-Strip Rubber Insulation made possible an increase in production of approximately 40% over wire with ordinary rubber insulation.

Belden Easy-Strip Rubber Insulation leaves even stranded wire, which is normally so hard to strip and clean, ready for soldering. No sandpapering or any other laborious process of cleaning is needed.

Easy-Strip Rubber Insulated Wire is but one item of the complete Belden line of wire for electrical manufacturers. Write for catalog.

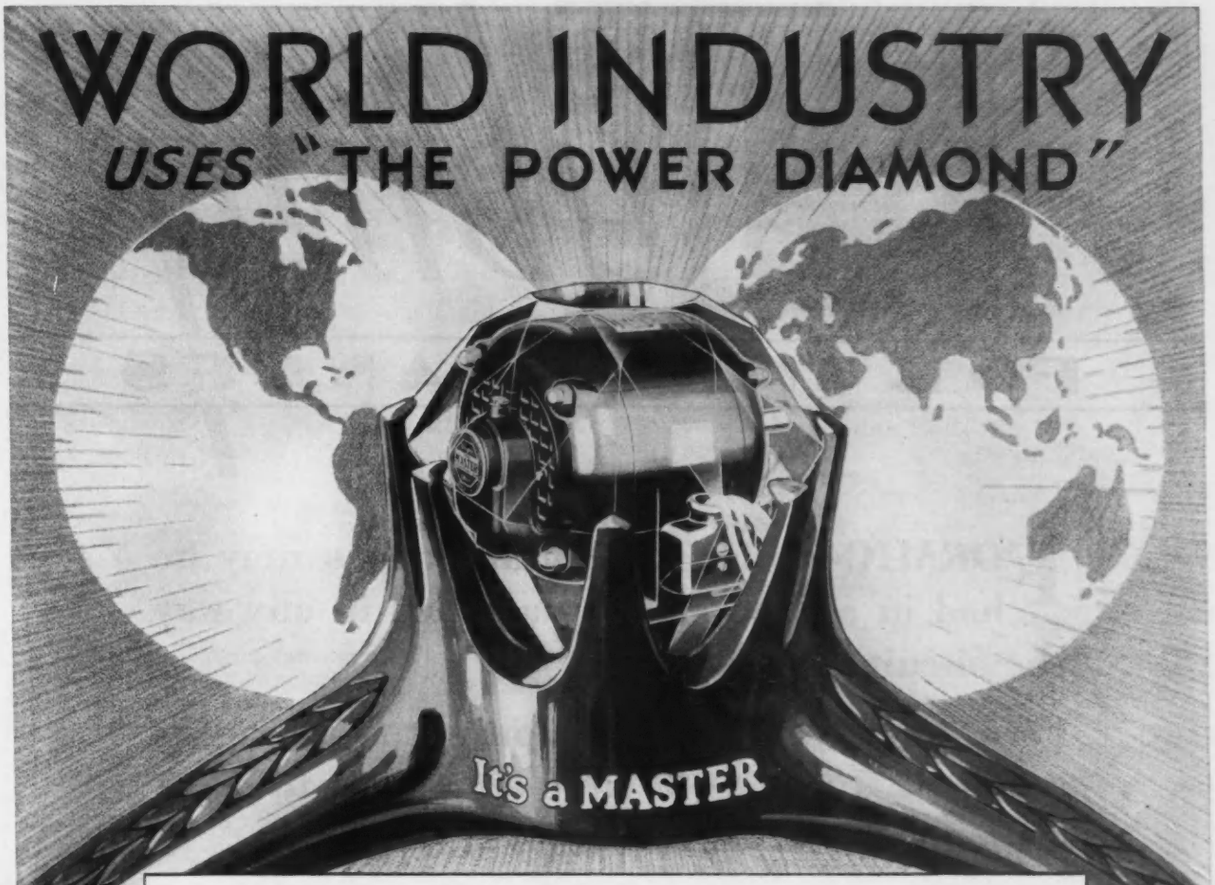
BELDEN MANUFACTURING COMPANY
4633 W. Van Buren St. Chicago, Illinois

Belden

Belden Products

Beldenamel and Textile Magnet Wire • Bakelite Moldings • Coil Windings • Automotive Wires and Cables • Airplane Assemblies • Radio Wires, Cords and Cables • Rubber Covered Wires • Armored Cables • Flexible Armature Wires • Motor Lead Wires • Braided and Stranded Copper Cables • Cotton Sleeving

WORLD INDUSTRY
USES "THE POWER DIAMOND"



More than seventy manufacturers of pumps; fifty builders of woodworking machinery; fifteen manufacturers of air compressors, and a great many other makers of motor-driven machinery and appliances of various types equip the products that bear their name, with Master Guaranteed Motors. The complete record of applications of Master Motors to these machines is a most impressive recognition of Master Quality by Industry—both American and foreign.

These manufacturers realize that the motor is a vital part of the complete product. The dependability that characterizes the Master Motor insures dependable service from the machines *they* produce. The Master is built to handle the largest percentage of abnormal operating conditions that are likely to be encountered. The actual records of long faithful service, and of perfect functioning even under extremely adverse conditions, establish its title to "Power Diamond"—with a value definitely known and a performance that is *brilliant*. We would be glad to discuss your specific motor requirements.

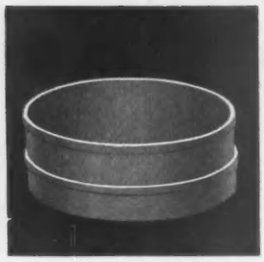
THE MASTER ELECTRIC COMPANY
DAYTON, OHIO

STOCKS CARRIED IN PRINCIPAL CITIES

MORE THAN 100 SERVICE STATIONS

MASTER GUARANTEED MOTORS

1/20 TO 10 H.P. Dayton THE MASTER ELECTRIC CO. Ohio *Not More Than 40°*



Tubing

FOR INDUCTANCES

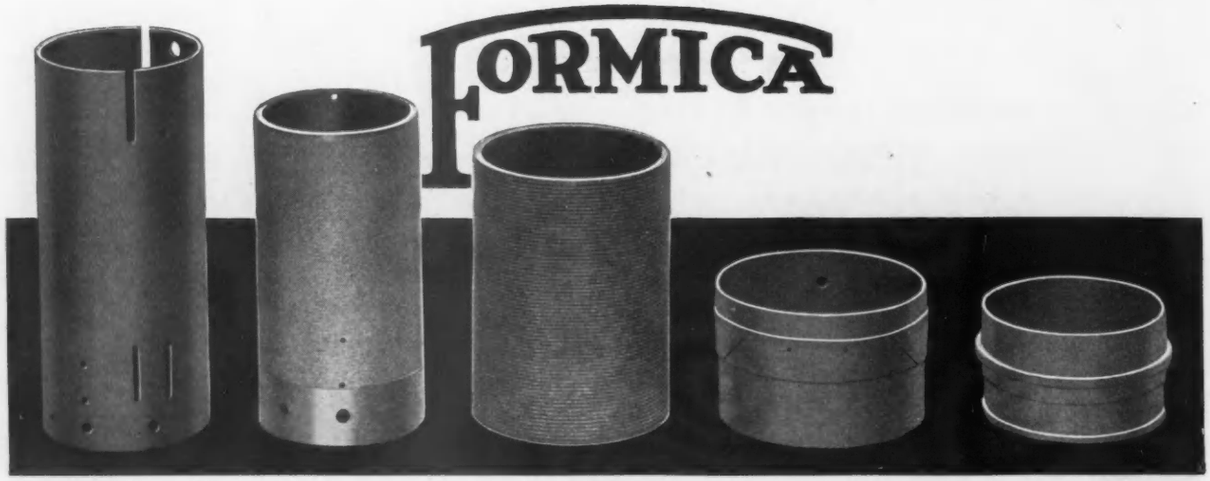
FORMICA tubing for inductances may be had in all the sizes, machined in any way the circuit may require.

Formica has adequate equipment to thread it, punch it, turn it—in large quantities to meet difficult delivery schedules.

You can depend on tubing of excellent quality accurately machined.

Send your blue prints for quotations.

THE FORMICA INSULATION COMPANY
4636 Spring Grove Avenue
Cincinnati, Ohio



JUL 17 1930

Electrical Manufacturing

Reg. U. S. Patent Office

Volume 5 JUNE, 1930 Number 6

Stanley A. Dennis, *Editor*

LEON I. THOMAS
Managing and Engineering Editor

ROGER L. KNIGHT
Associate Editor

LESLIE H. ALLEN
Associate Editor

IRWIN ROBINSON
News Editor

RAY B. WHITMAN
Patent Editor

LLOYD W. DUNN
Art Editor

ELECTRICAL MANUFACTURING's editorial program has the following objectives:

Production

To help all electrical manufacturers, including makers of motor-driven products, increase the product's salability, cut unit production costs, quicken turnover, reduce overhead expenses, establish standard methods of work, and spread a better knowledge of raw materials and parts.

Marketing

To spread a better knowledge of and aid electrical manufacturers in adjusting sales management to the buyers' market, to aid in making advertising more effective, finding the most profitable distribution channels, and promoting cooperative market development.

Administration

To further the working out of sounder management policies and better executive control, coordinating sales and production schedules, promoting research, and developing better industry relations.

Repairing

To help all motor repair shops to build better business by developing a sounder organization, improving management, policies and methods, and developing a keener merchandising point-of-view on the business.

Contents of This Issue

What NEMA Did at Hot Springs 27
A. Edward Newton—A Personality Sketch by *Chapin Hoskins* 30
How to Make Coil Wedges ..... *F. S. Wheeler* 32
Shall We Weld It or Cast It? ..... *A. F. Davis* 34
Hard Rubber Battery Jars ..... *McConnel Shank* 37
Here Is Another Motor Market 38
Let's Get Acquainted with Latin American Markets *Wilbur T. Gracey* 40
Cutting Costs by Splitting Seconds 43
Electrical Materials Widely Used—Hard Rubber *William Crawford Hirsch* 47
Dramatize Your Product ..... *Roger L. Knight* 49
Even Material Handling Yields to Wage Incentive Plans *C. A. Fike* 52
Editorials 53
People Have Been After This Information .... *J. K. Olsen* 54
7 Motor Tests 57
Ready to Apply 58
A Fair Exchange with the Census Bureau 60
Are You Liable for a Defect in Insulation in Your Product? ..... *Leslie Childs* 61
Putting a Mining Idea to Work in a Factory 62
Facts, Figures and Trends 63
Electrical Patent News ..... *Ray Belmont Whitman* 65
Facts Worth Knowing About Patents 76
Annunciator Components 78
Electrical Manufacturing News 80
New Goods for Your Inspection 88
Index of Raw Materials, Parts and Electrical Equipment 92

ELECTRICAL MANUFACTURING does not publish any news or comment relating to either personal or patent controversies. Signed articles express the thought of the contributor, but not necessarily that of the editor or publisher.

Published Monthly and Copyrighted by

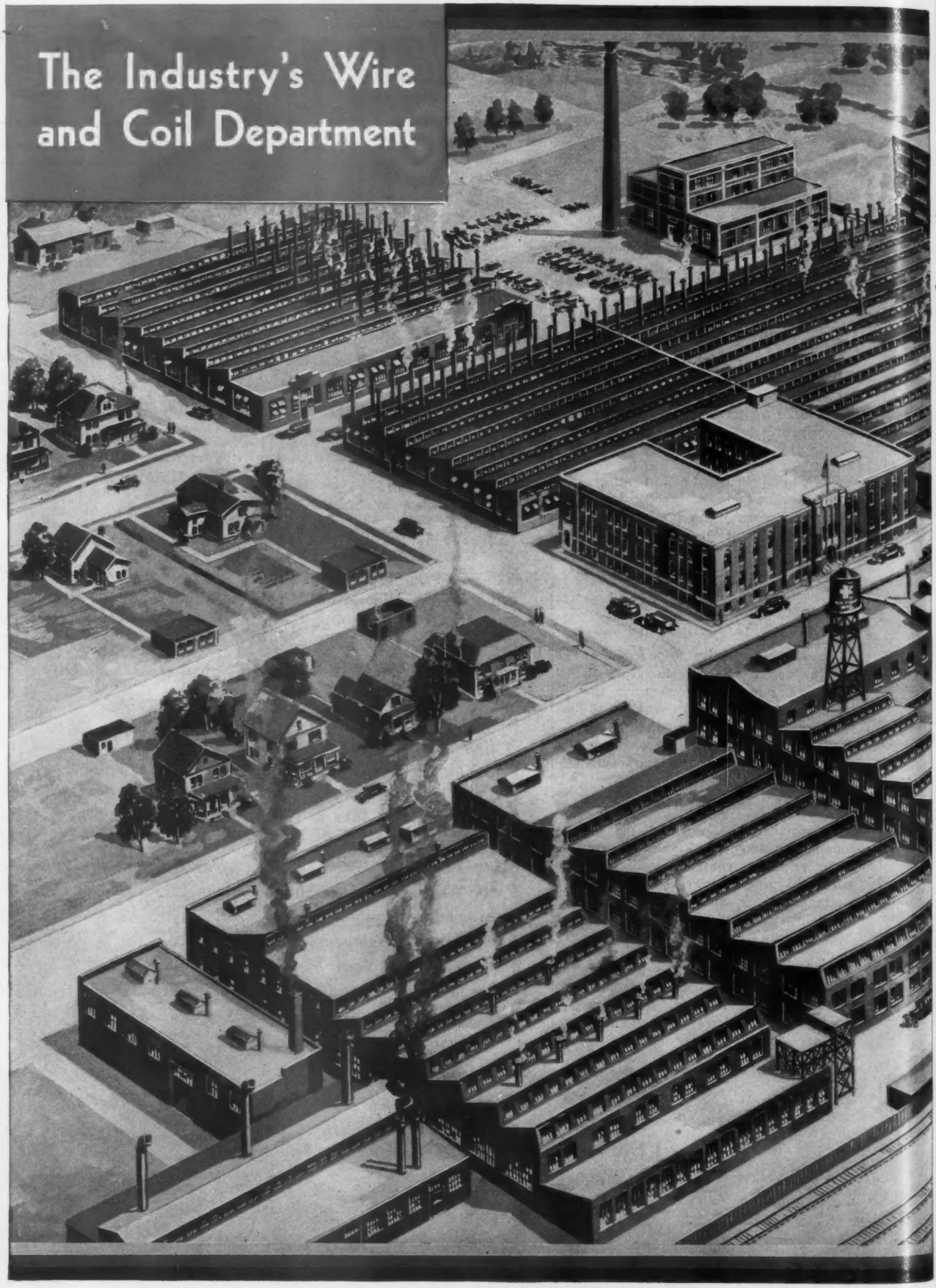
The Gage Publishing Company, Inc.

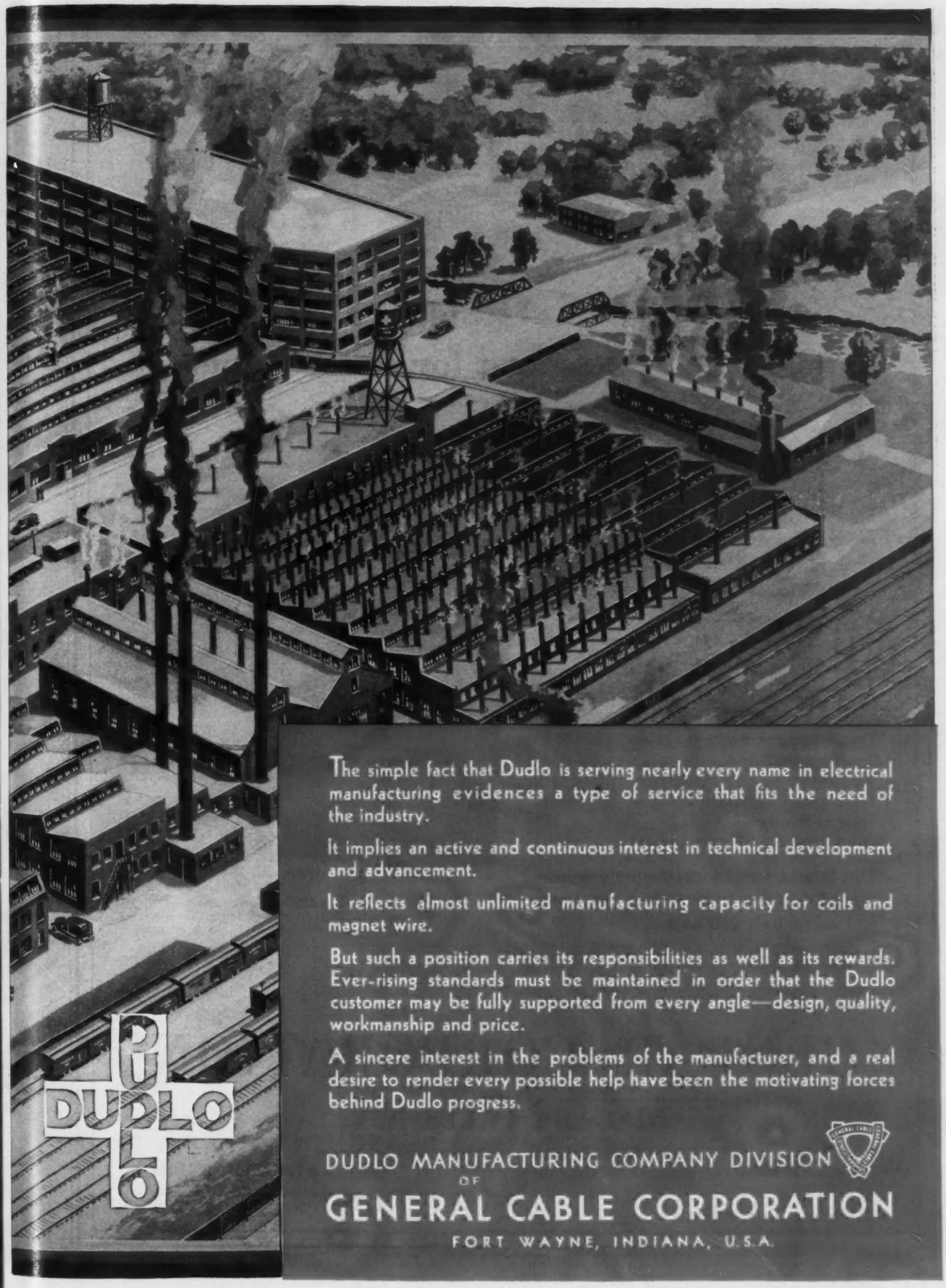
Nelson W. Gage, *President* — J. F. McClure, *Vice-Pres. and Secretary* — J. C. Prior, *Treasurer* — Stanley A. Dennis, *Editor and Assistant to President* — L. C. Fletcher, *Advertising Manager*

461 Eighth Avenue, New York, N. Y.

Chicago Office: 731 Monadnock Block, L. C. Bassett, *Manager* **Cleveland Office:** 501 Caxton Building, Harry Krohn, *Manager*

SUBSCRIPTION RATES: United States, Canada, Mexico, $2.00 a year. Foreign Countries, $3.00 a year. 25 cents a copy.


The Industry's Wire
and Coil Department



The simple fact that Dudlo is serving nearly every name in electrical manufacturing evidences a type of service that fits the need of the industry.

It implies an active and continuous interest in technical development and advancement.

It reflects almost unlimited manufacturing capacity for coils and magnet wire.

But such a position carries its responsibilities as well as its rewards. Ever-rising standards must be maintained in order that the Dudlo customer may be fully supported from every angle—design, quality, workmanship and price.

A sincere interest in the problems of the manufacturer, and a real desire to render every possible help have been the motivating forces behind Dudlo progress.

DUDLO MANUFACTURING COMPANY DIVISION
OF
GENERAL CABLE CORPORATION
FORT WAYNE, INDIANA, U.S.A.

AGAIN Globar BRAND Electric Heating Elements Establish a New Standard for Performance

REG. U.S. PAT. OFF.

THIS LITTLE RADIANT HEATER MAKES B.T.U.'s DO TRICKS.

The problem as presented was to obtain high efficiency through the use of an electric heater mounted externally on an uninsulated tank containing 2¾ gallons (22.9 lbs.) of water. How well we handled the assignment is reflected in the accompanying tabulated data.

PERFORMANCE DATA

Pounds of Water	22.9
Temperature of Water at Start	68° F.
Temperature of Water at Finish	208.8° F.
Temperature Rise	140.8° F.
Watt Input	949
Temperature of Globar Element	1730° F.
Time in Minutes	112
Overall Efficiency, Starting Cold	53½%

The Heater was designed for three-heat control—high, 1000 watts; medium, 500 watts; low, 250 watts.

Heater Designed by Globar Corporation

What is Your Heating Problem?

GLOBAR CORPORATION

(A SUBSIDIARY OF THE CARBORUNDUM COMPANY)

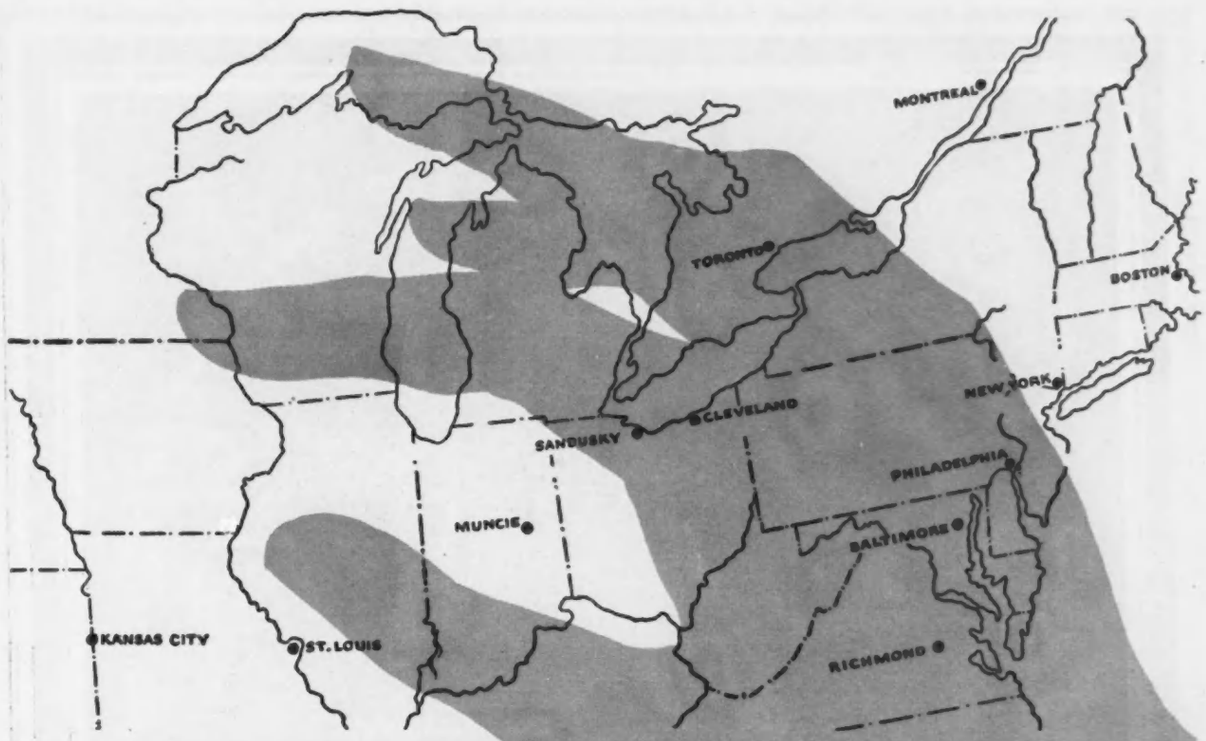
NIAGARA FALLS, N. Y.

Pacific Abrasive Supply Co., San Francisco and Los Angeles

Williams & Wilson, Ltd., Montreal—Toronto, Canada

Steinmetz & Company, Philadelphia

(Globar is the registered trade name given to non-metallic electrical heating and resistance materials, and to other products of Globar Corporation, and is its exclusive property.)



ONE OF TWELVE PLANTS
Within Your Easy Reach

Telephone the H & D office near you for samples and prices

Baltimore.....No. Haven and Fairmount Ave.
Boston.....119 Braintree St., Allston Station
Cleveland...1220 Terminal Bldg.
Kansas Ciiy...Kansas City Fibre Box Co., Packers Station
Muncie.....P. O. Box 357
New York.....2 Lafayette St.
Philadelphia...348 Drexel Bldg.
Richmond.....P. O. Box 1538
Sandusky.....829 Decatur St.
St. Louis.....5110 Penrose St.
Toronto.....King Street Subway and Hanna Ave.
Montreal...The Hinde & Dauch Paper Co. of Canada, Ltd., Masson and Des Erables Sts.

Twelve Hinde & Dauch box making plants, conveniently located in the principal industrial centers bring H & D packaging service within easy reach of every packer of food products. The H & D plant nearest you gives you close touch with an adequate and dependable source of supply, and insures prompt, efficient service on your corrugated fibre shipping box requirements.

Each H & D plant has back of it the complete resources, experience and facilities of the world's largest makers of corrugated fibre shipping boxes. A request for information, samples and prices involves no obligation on your part.

THE HINDE & DAUCH PAPER COMPANY
325 Decatur Street — Sandusky, Ohio
Western Address: Kansas City Fibre Box Co., Packers Station, Kansas City, Kansas
Canadian Address: King Street Subway and Hanna Ave., Toronto

HINDE & DAUCH *corrugated fibre* SHIPPING BOXES

May we send you a copy of "How to Pack It"? It illustrates modern methods of packaging in your industry. Mail the coupon for a free copy.

THE HINDE & DAUCH PAPER CO., 325 Decatur St., Sandusky, Ohio
Please send a copy of "How to Pack It" to
Signature .....
Company .....
Address .....
Town ..... State .....

Issuing from hundreds of institutions of technical education, many thousands of engineering students are annually carrying into industry and scientific pursuits a logical partiality for Weston electrical measuring instruments. Weston equipped industries are also partial to students with Weston training. It is naturally a reciprocal interest since Weston instruments are the accepted scientific standards of the world.

Weston Electrical Instrument Corp.
582 Frelinghuysen Ave. Newark, N. J.

Weston
PIONEERS SINCE 1888
INSTRUMENTS

Makers Of The World's Highest Standards
Of Quality-Accuracy-And Dependability.

"What Price . . . . . Price Wars?"

When prices come tumbling down something is bound to happen—and it usually is not to the advantage of the man who buys.

Let us caution those who would seek "bargains" to look further for reliability of materials, high quality of workmanship and dependability of service and delivery.

HATFIELD RUBBER WORKS, Inc., HILLSIDE, N. J.

Factories: Hillside, N. J., *and* Hackettstown, N. J.

New York	Rochester	Portland	St. Louis	San Francisco	Cleveland	Denver
Philadelphia	San Antonio	Chicago	Lincoln	Seattle	Pittsburgh	Oakland
Baltimore	Los Angeles	Boston	New Orleans	Detroit	Minneapolis	St. Paul

YOU CAN'T NAME A KIND OF ELECTRICAL CORD THAT HATFIELD DOESN'T MAKE

It CAN'T be tush-tushed

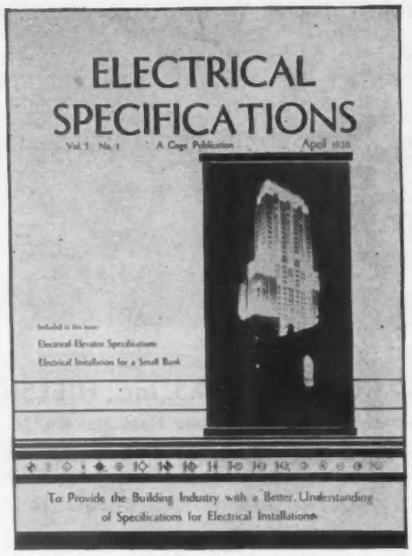
When your product is intelligently written into a wiring specification it stays . . . it means business—*therefore* see that the responsible factors know your product.

Tell them about it in the publication which is their exclusive electrical authority. Get directly before them in ELECTRICAL SPECIFICATIONS, to which they look for up-to-date, correct, approved electrical practice.

The men responsible for proper wiring specifications—architects, specifying electrical engineers and electrical inspectors—have a big job. They are eager to know what's what, how and why, and ELECTRICAL SPECIFICATIONS has given them their first taste of authoritative electrical information.

As the manufacturer of a product which you want to see adequately specified, your responsibility is to make use of this direct channel. These specifying allies, whose offices have been so generally difficult of access, are ready and willing readers of your message in ELECTRICAL SPECIFICATIONS. Why? Because the electrical planning of today's buildings is of vital importance to them. Safety and adequacy in every wiring installation has become a first essential.

And as these specifying factors become more familiar with your product, their specifications will mean more business for you. The four-billion-dollar annual building market that these men control should have a rising proportion of electrical business governed directly by the consistent advertising to them by electrical manufacturers.


ELECTRICAL
SPECIFICATIONS
Vol. 1 No. 1 A Gage Publication April 1930
Included in this issue:
Electrical Elevator Specifications
Electrical Installation for a Small Bank
To Provide the Building Industry with a Better, Understanding of Specifications for Electrical Installations

Circulation Guaranteed 10,000 Monthly

ELECTRICAL SPECIFICATIONS has a seasoned publishing span of 38 years successful service to the electrical industry behind it. It is the recognized and direct approach to this market.

THE GAGE PUBLISHING CO., Inc., 461 Eighth Ave. New York, N. Y.

ELECTRICAL SPECIFICATIONS

— GAGE PUBLICATIONS —

ELECTRICAL RECORD
ELECTRICAL MANUFACTURING ELECTRICAL SPECIFICATIONS
METROPOLITAN ELECTRICAL NEWS

THE WORLD FIGHTS FRICTION

Monsieur Cardinet employed the ball bearing in 1802 to overcome the friction of a familiar amusement device, the merry-go-round or carrousel. In place of the usual rollers he substituted balls held in circular tracks, separated by collars held in place by springs.

WILL your machines receive proper care and attention after installation in users' plants? That cannot be safely forecasted. The best policy is to make Torrington Ball Bearings standard equipment.

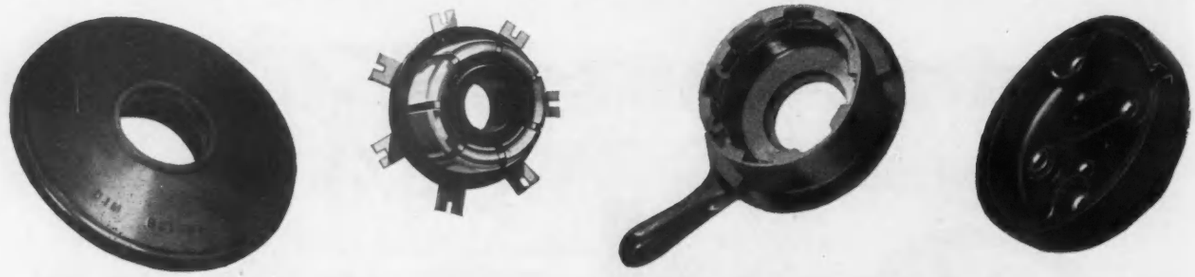
These fine anti-friction devices truly deserve the title of *precision*-made. Extraordinary precautions are taken to insure their accuracy... and to put them into your hands in the same fine condition in which they leave our testing shops.

The consistent accuracy of Torrington Ball Bearings contributes to the performance of your products.

DISTRICT SALES
S. W. ANDERSON
565 W. Washington Blvd.
Chicago, Ill.

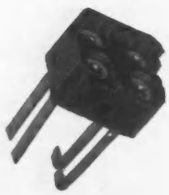
The Torrington Company
ESTABLISHED 1866
Torrington, Conn., U.S.A.

REPRESENTATIVES
The TORRINGTON COMPANY
Curtis Building
2842 W. Grand Boulevard
Detroit, Mich.



The better the source the better your parts

WHEN you select International for the source of your molded parts, you have the benefit of more than half a century of progressive achievement in perfection and punctuality.



International advanced methods and facilities, together with constant large-scale production in wide variety, insure the most efficient handling of every custom molding job. Our service includes everything connected with molding, and our estimates are at your disposal without obligation.

PRECISION MOLDERS OF BAKELITE AND OTHER PLASTIC MATERIALS

INTERNATIONAL INSULATING DIVISION

The General Industries Company

ESTABLISHED 1875 · · ELYRIA, OHIO

This Advertisement is appearing in the JUNE issue of ELECTRICAL MERCHANDISING

FEWER COMPLAINTS

~~~more Satisfied Customers

U. S. Patents 1,413,564 1,884,122—1,887,954 Other patents pending. Foreign patents.

from **Products Equipped** *with*

SHAKEPROOF
Lock Washers

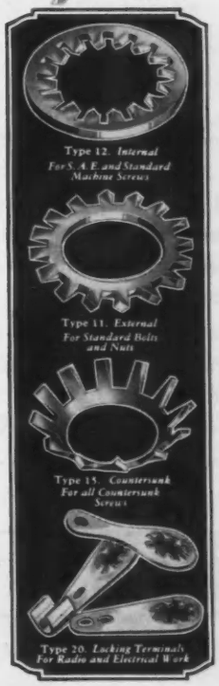
WHEN you sell a washing machine, radio, vacuum cleaner or any other device, you know that you are likely to have calls for service. These calls cost you money and reduce your profits, but you must keep your customers satisfied.

Products that are equipped with Shakeproof Lock Washers will need less service because they are thoroughly protected against vibration. The twisted steel teeth of this marvelous locking method dig into both the nut and the work surface and they cannot let go. This prevents faulty connections—lost parts and poor performance that is so often due to ordinary washers.

Test Shakeproof Lock Washers on your next service job and you'll realize why leading manufacturers in over 100 industries are now using this washer. Send for samples today.

"Its the Twisted Teeth that LOCK"

Insist on Shakeproof equipped products—it means bigger profits for you!



Type 12. *Internal For S. A. E. and Standard Machine Screws*

Type 11. *External For Standard Bolts and Nuts*

Type 15. *Countersunk For all Countersunk Screws*

Type 20. *Locking Terminals For Radio and Electrical Work*

SHAKEPROOF
Lock Washer Company
(Division of Illinois Tool Works)
2533 KEELER AVE. CHICAGO, ILLINOIS

CHROMIUM
HAS CAUGHT ON!

These smart, modern home appliances, clad in sparkling chromium ...they certainly have caught the feminine fancy! And they have held it...because they hold their beautiful brilliance permanently, without metal polish or arm-breaking work. There's no platform surer to win a woman's vote!

Chromium is just as popular on the other side of the counter. Retailers are partial to the fast-moving chromium plated lines. Chromium saves work for them, too...never tarnishes on their shelves.

Modern-minded manufacturers, with an eye to the sales sheet, are successfully meeting the demand for chromium with the help of United Chromium, Inc. The U. C. process assures the finest chromium plate on a regular production basis. Our engineers cooperate in installing plating departments . . . in training platers . . . in maintaining solutions.

We would be glad to give you details of this service...or, if your needs do not warrant a plating department... to send you a list of our job plating licensees.

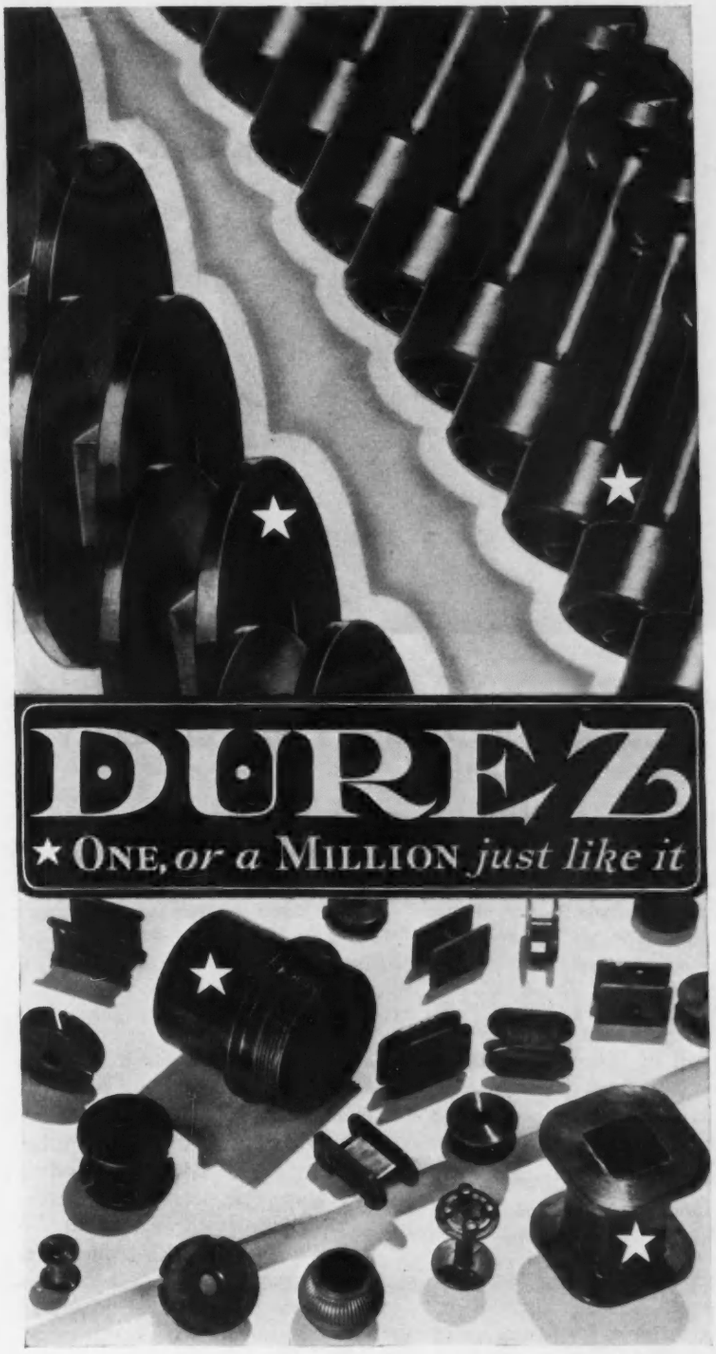
UNITED CHROMIUM
INCORPORATED

Executive Office: 51 East 42nd Street, New York City

Chicago, Ill. ◆ *Cleveland, O.*

Detroit, Mich. ◆ *San Francisco, Calif.* ◆ *Waterbury, Conn.*

If you're having trouble with spindles and spools . . . *switch to* DUREZ!



Write for this new, free booklet, "Do It With Durez." Illustrated, it contains complete information about Durez . . . physical and dielectric properties, color ranges, and scores of possible applications.

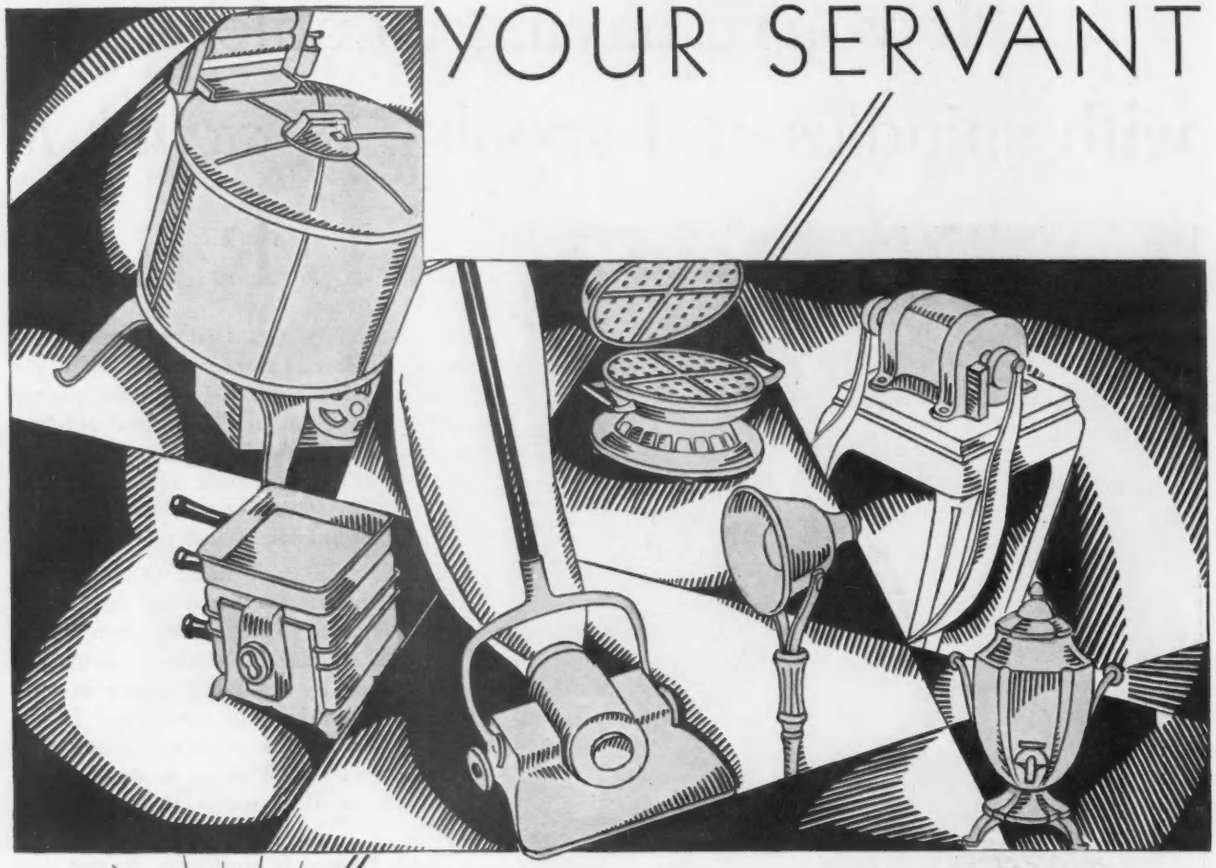
You probably are. Ordinary spools absorb moisture. Some shrink with the room temperature, distort under operating stress. Some are heavy and cumbersome. Break easily. Uneven surfaces catch and hold material. If your present material is unsatisfactory from any of these standpoints, switch to Durez!

Durez is a basic molding compound. Spools, spindles, pulleys, and coils made from it are strong, hard, non-brittle. Able to stand heat without distortion. Unaffected by sudden changes in temperature, Durez will not warp. It virtually never splits, cracks or chips even under pressure. Due to its non-conductivity it is ideal material for winding coils.

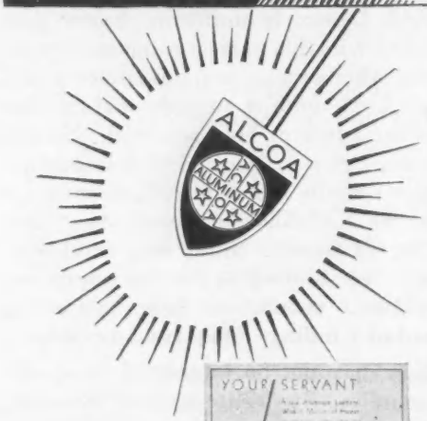
And Durez is uniform. Every part molded with this perfect compound is the same, whether you turn out one or a million. Each with a smooth surface that will not catch or hold material. No unbalanced pieces. No variation in quality. When threads are required, threads are accurate. Molded, not cut, they seat easily, fit tightly. Studs and reinforcements are inserted in the one operation. . . . Durez spools are light, increasing speed of winding. They run smoothly.

You may not be interested in spools or spindles. But whatever your business, whatever parts you make or use, Durez can probably help you. Investigate! Our engineering and laboratory staff is available for a discussion of your particular problem—even though it be the corrosive action of acids, alkalies, solvents or soldering fluxes. Write to General Plastics, Inc., 69 E. Walck Road, North Tonawanda, N. Y. Also New York, Chicago, San Francisco, Los Angeles.

YOUR SERVANT



. . . favorably known is half sold . . .



These advertisements recently appeared in national magazines.

In any line of business the best known—the most favorably known—merchandise sells fastest.

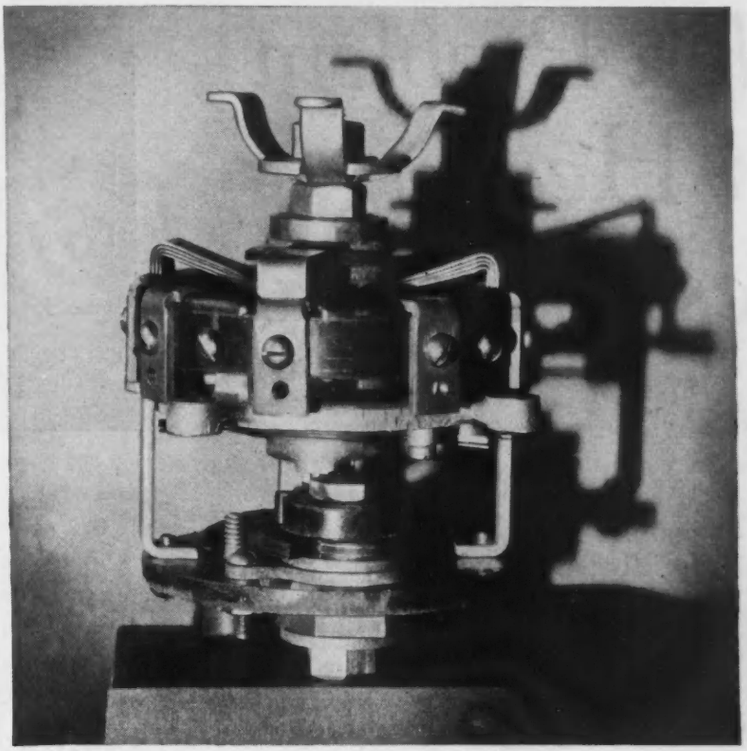
Few customers understand, or want to understand, the intricate mechanics of the washing machine, ironer or vacuum cleaner that they buy. But they want to know what it is made of and who made it

Link your name with materials of known worth and your reputation and sales grow

Say "aluminum" to a housewife and she thinks of "a bright metal—light in weight—easy to keep clean—that wears forever—keeps its lustre—will not rust". Alcoa Aluminum is the housewife's servant. In some of its many forms she uses it many times a day. She knows it, is familiar with its qualities, will buy products made of it.

Furthermore, she is reading much about Alcoa Aluminum these days. Consistent advertising in Good Housekeeping, Saturday Evening Post, Country Gentleman and other papers gives her concise, interesting facts about this metal. This advertising is helping to sell your products—if they are made of Alcoa Aluminum. Our nearest office will gladly tell you how Alcoa Aluminum can be used to advantage in your manufacturing and selling. ALUMINUM COMPANY of AMERICA; 2444 Oliver Building, PITTSBURGH, PENNSYLVANIA

ALCOA ALUMINUM



X-Ray Selector Switch with insulation parts of shock-resistant Bakelite Molded. Made by American X-Ray Corporation, Cleveland, Ohio

TOUGHNESS OF SHOCK-RESISTANT BAKELITE MOLDED A BOON TO THIS SWITCH MANUFACTURER

When the insulation ring of the X-Ray Selector Switch was formed from a section of tubular insulating material, many machining operations were necessary, and the finished ring was unsatisfactory in appearance. The construction of this switch is such that it demands a ring which is exceedingly tough and strong, accurate in dimension, and of high insulating value. Shock-resistant Bakelite Molded is meeting every electrical and mechanical requirement for the insulation ring and for the base and a pinion used in the same switch.

Shock-resistant Bakelite Molded possesses a degree of toughness and durability superior to other forms of molded insulation. It may be molded to accurate dimensions, and any required holes, bosses or recesses may be formed in the mold. Metal inserts may be firmly embedded. In many instances where high insulation value must be combined with great physical strength, shock-resistant Bakelite Molded is proving highly satisfactory. Write for Booklet 52L, "Bakelite Laminated", containing a description of this, and other, insulation materials.

Bakelite Engineering Service—We manufacture a wide variety of phenol resinoid molding materials, varnishes, lacquers, enamels, cements, and other products. Twenty years experience in the development of these materials for electrical and other uses, provides a valuable background for the cooperation offered by our engineers and laboratories.

BAKELITE CORPORATION, 247 Park Avenue, New York. CHICAGO OFFICE, 635 West Twenty-second Street
BAKELITE CORPORATION OF CANADA, LIMITED, 163 Dufferin Street, Toronto, Ontario

BAKELITE

REGISTERED U. S. PAT. OFF.

"The registered Trade Mark and Symbol shown may be used only on products made from materials manufactured by Bakelite Corporation. Under the copyright "B" is the numerical sign for infinity, or unlimited quantity. It symbolizes the infinite number of present and future uses of Bakelite Corporation's products."

THE MATERIAL OF A THOUSAND USES

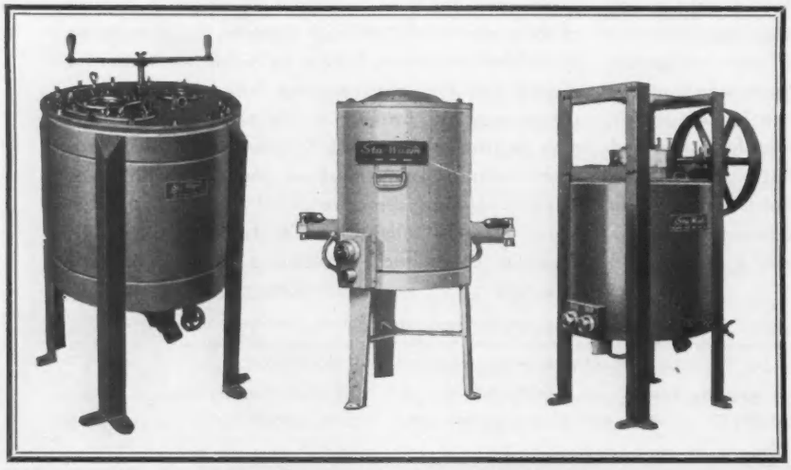
Counsel for the Engineer with a Problem In Heating Process Materials

ONCE more the problem of lowering production costs is being placed before equipment engineers. Faced with the prospect of diminished volume, the problem of costs in many plants is more important today than for many years.

To equipment men, puzzled where to turn next, we suggest that the *heating process materials* be carefully examined. Perhaps you will find workmen wasting time, watching and adjusting temperatures . . . spoilage of process materials from overheating . . . damage to product from use of materials at improper temperatures . . . production delays at points where process materials are poured. These are only a few of the costs that can be reduced and eliminated by the use of STA-WARM automatic electric heaters.

STA-WARM heats automatically with dependable electric current applied evenly to side walls. No hot spots. A patented thermostat holds temperature at any predetermined point—always right, always ready for use. Heated outlet prevents congealing.

STA-WARM heaters are made in standard sizes up to 50 gallons—special sizes to 100 gallons. Hundreds are in use in electrical manufacturing plants. New applications are being made daily. Submit your problem to STA-WARM Engineers. Their counsel and suggestions are available to you without charge or obligation. Write, giving necessary details of your heating operations.



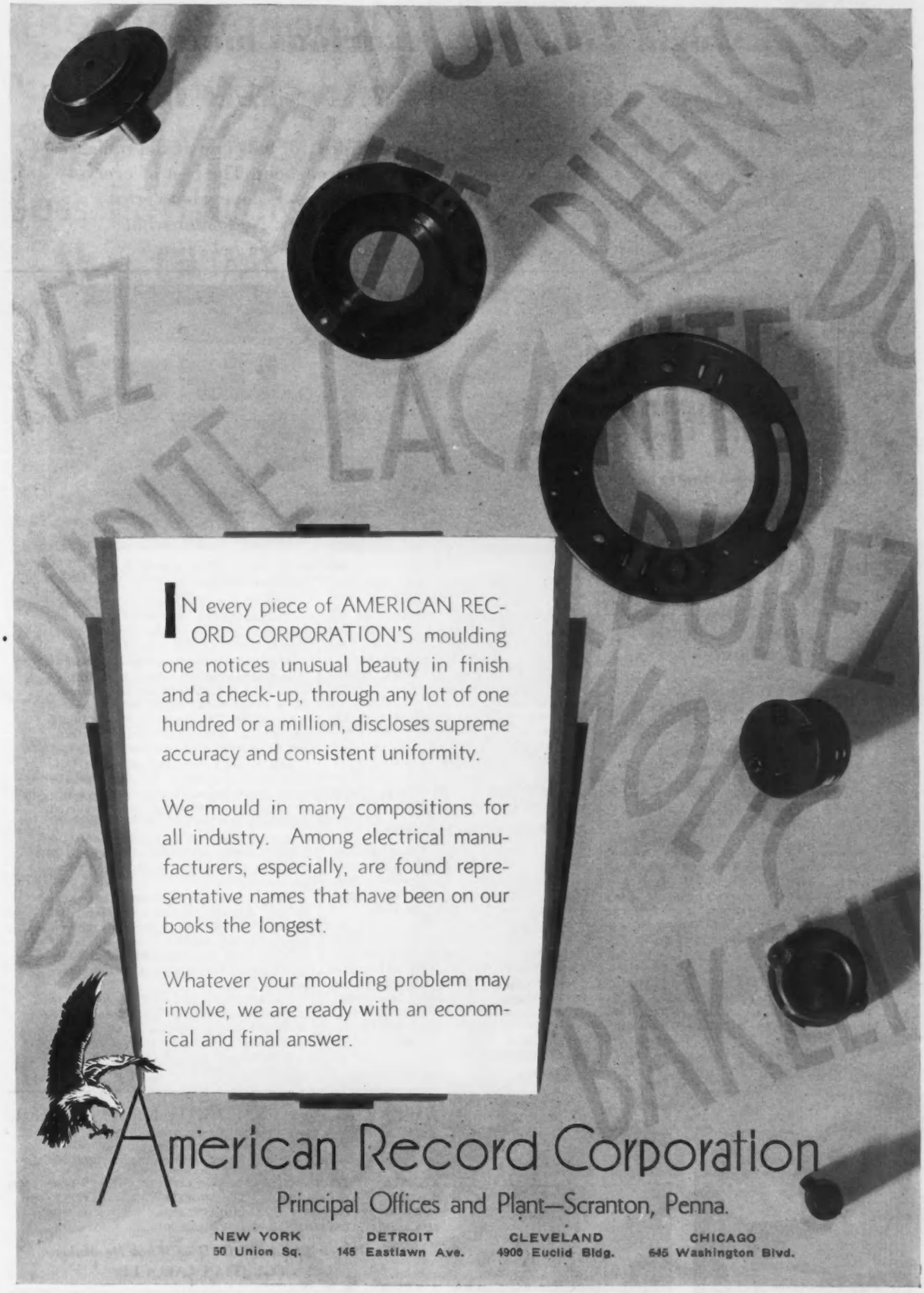
Beckwith Machine Company
402 Chestnut Street, Ravenna, Ohio

Sta-Warm

AUTOMATIC ELECTRIC HEATERS

for

Wax	Rosin	Sealing Wax	Tar
Pitch	Solder	Babbitt	Enamel
Stator Compound	Cement	Paraffine	Korite
Parolite	Leverite	Hydroline	Oil


IN every piece of AMERICAN RECORD CORPORATION'S moulding one notices unusual beauty in finish and a check-up, through any lot of one hundred or a million, discloses supreme accuracy and consistent uniformity.
We mould in many compositions for all industry. Among electrical manufacturers, especially, are found representative names that have been on our books the longest.
Whatever your moulding problem may involve, we are ready with an economical and final answer.
American Record Corporation
Principal Offices and Plant—Scranton, Penna.
NEW YORK 50 Union Sq.
DETROIT 145 Eastlawn Ave.
CLEVELAND 4900 Euclid Bldg.
CHICAGO 645 Washington Blvd.

The world's most Luxurious motor car is finished with EGYPTIAN LACQUERS

The account below, from the Buffalo Courier Express, April 13, tells one of the romances of modern industry.... Egyptian Lacquers were used throughout. The best of everything was used.... But 99 44/100% of Egyptian business is done where *price* is a factor, too. Egyptian quality has been proved to *pay*. No matter *what* you make—if it takes a permanent finish—Egyptian can *help* you.

BUFFALO-BUILT CAR GOING TO SHAH OF PERSIA

Bejeweled Pierce-Arrow to be exhibited here before being shipped away

DIAMONDS, GOLD USED

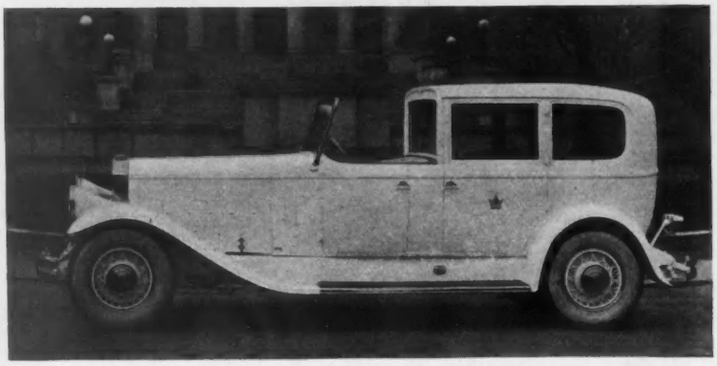
Persian ruler's new automobile represents the ultimate in luxury

Completion of the world's costliest motor car, a magnificent bejeweled white and gold automobile, for Riza Khan, Shah of Persia, is announced by the Pierce-Arrow Motor Car Company of Buffalo. It was created in collaboration with Brunn, famed custom body builder, as a parade car for public ceremonies.

The car will be on exhibit to the public for two days only, Sunday and Monday, at Pierce-Arrow's new Buffalo showrooms, Main Street and Jewett Avenue. It then will be housed in a special cabinet and sent by express to New York, where it will be placed on board ship for immediate sailing.

The adoption of the motor car by his imperial highness reflects the transformation being brought about by the Shah, who, like Mussolini and Kemal Pasha, emerged from obscurity as a self-constituted monarch to force his people into step with the twentieth century West.

Although the imperial car is one of the most luxurious equipages of all times, it by no means typifies the Shah's customary mode of living. As reported by Lady Drummond-Hay in the World Traveler, the Shah, successor if he wishes to all the luxury, splendor, ceremony and privileges of his predecessors, dines alone with his wife in the simple manner of any ordinary happy and devoted menage.



Special Pierce-Arrow for the Shah of Persia, body by Brunn & Co., finished entirely in Egyptian Lacquer

Regal in appearance, the style of the body design resembles that of a town car. Although of unusually liberal dimensions, it is low-hung and graceful.

Straight Eight Engine

The chassis, of standard Pierce-Arrow manufacture, the duplicate of many in daily use in the streets of Buffalo, measures 144 inches wheelbase. The engine is a straight eight and develops 132 horsepower.

The coachwork, however, represents the ultimate in luxury. Of spotless white, the exterior is richly relieved by stripings of gold and by the gold-plated metal work—the fender headlamps, the door latches, the radiator, the windshield frame, the inlaid metal striping on the thick rubber running boards, and the bumpers.

Emblazoned on both doors is a golden bas-relief replica of the Persian royal crown, mounted with a green jewel.

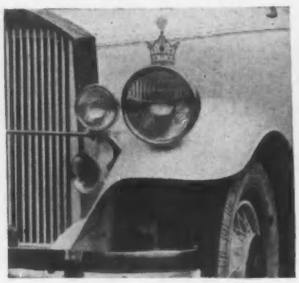
The interior is upholstered in a light champagne-colored silk rep, embroidered with wreaths, a family insignia. It is piped with white leather, edged with gold. The wood trim is inlaid satinwood. The silk window curtains are finished in a figured design.

The broad luxurious cushion is tailored in one expanse of cloth, as the Shah rides alone. On the floor is a rug of Russian wolfhound fur, imported especially for the car.

A cigarette case and lighter of solid gold, encrusted with diamonds, is mounted within easy reach of the royal passenger.

The chauffeur's compartment also reveals a lavish use of gold plate, the steering column, the instrument mountings and the control levers all being finished with the precious metal. The car is glazed throughout with non-shatterable glass.

The award of this order is a tribute to Pierce-Arrow and the craftsmanship of Brunn & Co. Pierce-Arrow has always held a prominent position as a creator of fine custom coachwork.



THE EGYPTIAN LACQUER MFG. CO.
90 WEST STREET - NEW YORK CITY

Branches in charge of practical men *maintained in:*

ATLANTA	CINCINNATI	KANSAS CITY	SAN FRANCISCO
BOSTON	CLEVELAND	LOS ANGELES	SEATTLE
BUFFALO	DALLAS	PHILADELPHIA	SPOKANE
CHICAGO	DETROIT	PORTLAND, ORE.	ST. LOUIS

The Maker Who is PROUD of What He Makes,
USES EGYPTIAN LACQUER

The International Cutawl needs the Smooth Vibrationless Performance of a DUMORE

THE International Cutawl is a machine for cutting a wide range of materials into intricate scroll designs for display windows, signs, moving picture sets, models, patterns, inlaid linoleum, a typical example being shown above the machine in the illustration at the right. The work done by this machine requires very smooth, vibrationless motor performance.

The International Register Company, manufacturers of the Cutawl, says:

"We have been thoroughly satisfied with the Dumore Motor. Its dynamically balanced armature insures vibrationless and practically noiseless operation. We have had practically no complaints from customers of Dumore Motor failures—a record of which any motor manufacturer may well be proud.

The known advantages and dependability of the Dumore Motor have been valuable talking points in the sale of the International Cutawl Machine."

The facts of Dumore construction will interest you—write for them today!

THE DUMORE COMPANY
35 SIXTEENTH STREET RACINE, WISCONSIN

DUMORE
FRACTIONAL HORSEPOWER
MOTORS

90% of Baldor Users Repeat!

IT is highly significant that of the many firms which have ever bought Baldor Ball Bearing Motors, 90% are still active customers.

Only one thing could bind such a high percentage of users in so many different fields so continously to a product. That thing is Baldor performance . . . one important feature of which is the ability of Baldor ball bearing motors to completely eliminate the thrust and lubrication problems of the sleeve bearing type motors.

Naturally, firms which recognize the practically trouble-proof quality of ball bearing motors look to Baldor—who has always specialized in ball bearing designed motors and who has had 10 years time in which to perfect the Baldor Ball Bearing motor line.

Windings for all current characteristics. Ask for folder. Baldor Electric Co., 4352-C Duncan Av., St. Louis, Mo. U.S.A.

BALDOR

A BETTER BALL BEARING MOTOR

Eliminates Thrust and Lubrication Problems

A NEW AND BETTER THIN INSULATION

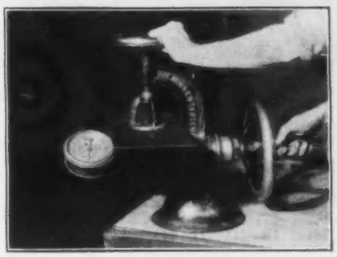
For Slot Insulation and Countless Other Purposes Where Thin Insulation or Mechanical Strength is Required.

Spaulding ARMITE...*Tests Higher*

in Dielectric, Mechanical and Bending Strength

GREATER ELECTRICAL STRENGTH

Dielectric strength tests on Spaulding Armite show an instantaneous puncture voltage as high as 700 with an average over 500 volts per mil thickness.

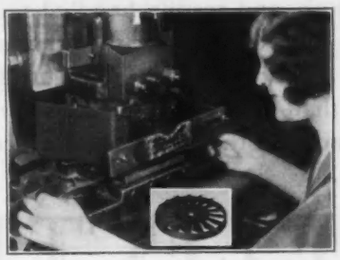


GREATER MECHANICAL STRENGTH

Mullen strength tests on Spaulding Armite show strengths exceeding 20 points per mil in the thickness used for armature slot insulation.

GREATER BENDING STRENGTH

Spaulding Armite can be formed without fracturing. No need to limit yourself to brittle material to get the dielectric properties required.



HERE it is . . . Spaulding Armite . . . a product that the electrical industry has long wanted . . . a thin insulating material (fish paper) with none of the defects of fish paper formerly used.

Spaulding Armite was perfected after two years of hard work by Spaulding Engineers and Chemists. Its Dielectric strength averages above 500 volts per mil thickness, with many individual samples testing up to 700 volts per mil. This Dielectric strength is uniform. One manufacturer reports that the best fish paper formerly obtainable punctured 200 times per hundred square yards under a certain voltage; at the same voltage Spaulding Armite showed only *one* puncture per *hundred square yards!*

Spaulding Armite is stronger . . . tougher . . . more resistant to puncture. It won't deteriorate with age. It is replacing other insulation wherever there is a possibility of puncturing or fracturing the insulation in assembling. Spaulding Armite stands forming operations which would rupture ordinary fish paper.

Use Spaulding Armite in motors . . . for linings in metal boxes . . . base and stiffener for duplex cloth . . . coil and transformer insulation . . . insulation for electrical equipment generally . . . also for any mechanical purpose where a strong, thin material is required. Give Spaulding Armite a chance to demonstrate its quality in your own factory or laboratory. Send for samples. Make your own tests.

SPAULDING FIBRE COMPANY, INC.
TONAWANDA, N. Y.
New York, N.Y. Chicago, Ill. Boston, Mass. Cleveland, Ohio
Milwaukee, Wis. Philadelphia, Pa. Cincinnati, Ohio Los Angeles, Cal.
Detroit, Mich. St. Louis, Mo. San Francisco, Cal.

Spaulding FIBRE (GENUINE HARD VULCANIZED) BAKELITE (LAMINATED) ARMITE (THE IDEAL THIN INSULATION)

Send for Samples . . . Make Your Own Tests

For Heating Appliances Fixtures of **TEXTOLITE**

MOLDED BY GENERAL ELECTRIC

JOIN US IN THE GENERAL ELECTRIC HOUR, BROADCAST EVERY SATURDAY EVENING ON A NATION-WIDE N.B.C. NETWORK

A HANDLE for a coffee percolator—a knob for a toaster—a thumb rest for an iron—a handle for a water-immersion heater—a switch case for an electric oven—these are among the fixtures of Textolite, custom-molded by General Electric. • Textolite is ideal for these applications. It is high in dielectric strength, strong and durable, attractive in color and finish, impervious to moisture, easily cleaned with a damp cloth, and readily handled regardless of the temperature of the appliance. • If there is a part in your product that can be molded, General Electric offers you its engineering service, its research and manufacturing facilities, backed by twelve years' experience in producing more than half a billion moldings. • To get in touch with the Textolite specialist in your district, address the nearest G-E office.

885-36

GENERAL ELECTRIC

SALES AND ENGINEERING SERVICE IN PRINCIPAL CITIES

Stocks like this—

of DILECTO and DIAMOND FIBRE are carried in New York, Cleveland, Chicago, Boston and Toronto

ALL our careful methods of analysis and manufacture would be wasted if we had not provided for adequate facilities of distribution.

Aside from the principal plants in Newark, Delaware, and Bridgeport, Pennsylvania, we have large warehouse stocks and fabricating plants in New York, Cleveland, Chicago, Boston and Toronto.

This assures the electrical manufacturer of prompt service and delivery of our insulating materials either in sheets, rods, tubes or in special shapes fabricated to specification.

DILECTO—is a water and moisture resisting laminated phenolic insulating material made in standard sheets, rods and tubes. It can be fabricated to meet your requirements.

DIAMOND FIBRE—is a hard vulcanized fibre made in standard sheets, rods and tubes and special shapes. It can be fabricated, bent or formed to meet your requirements.

Your engineering department will like one of our DECIMAL EQUIVALENT CHARTS

CONTINENTAL-DIAMOND FIBRE COMPANY

Manufacturers of Dilecto—Diamond Fibre—Celoron

NEWARK, DELAWARE

LOS ANGELES, CAL.
SAN FRANCISCO, CAL.
SEATTLE, WASH.
KANSAS CITY, MO.
MILWAUKEE, WIS.

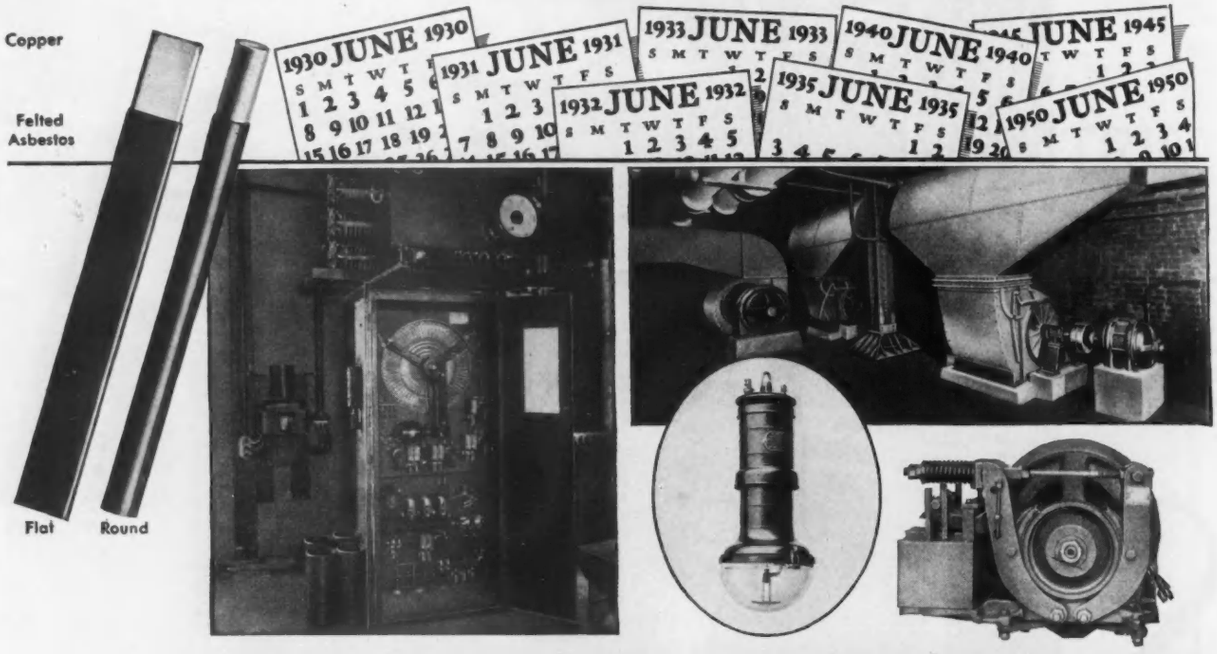
CHICAGO, ILL.
CLEVELAND, O.
BOSTON, MASS.

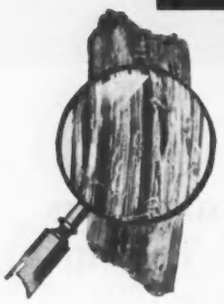
NEW YORK, N. Y.
SPARTANBURG, S. C.
PHILADELPHIA, PA.

ST. LOUIS, MO.
WASHINGTON, D. C.
DETROIT, MICH.
NEW ORLEANS, LA.
INDIANAPOLIS, IND.
MINNEAPOLIS, MINN.

In Canada
DIAMOND STATE FIBRE CO. OF CANADA, LTD.
350 Eastern Avenue, Toronto

IT GIVES *YOUR* PRODUCT LONGER LIFE





Deltabeston

(ASBESTOS INSULATED)

MAGNET WIRE

LONG-FIBER Asbestos For Deltabeston

Magnet Wire
Station Cable
Switchboard Wire
Motor Leads
Headlight Wire
Cab Cord
Stove Wire
Fixture Wire
Control Cable

Can you say, confidently, "My product *endures*"? Deltabeston Magnet Wire helps you put that sale-clinching quality into whatever you make... magnetic brakes, theater spot lights, magnetite arc lamps, automatic heat or power control apparatus, motor windings—an endless list.

Long life is sealed into Deltabeston Magnet Wire by the Deltabeston process of *felting* long-fiber, pure asbestos on the copper.

Whether the wire is round or square its wall of compact plastic asbestos is always uniformly thick over every edge and surface . . . doesn't crack open on sharp turns.

Heat has no effect. The tough, flame-proofed asbestos resists moisture, acids, abrasion. Deltabeston Magnet Wire is practically indestructible!

You can have it black or white, varnished or plain. Deliveries are immediate. Write Section Y-326, Merchandise Department, General Electric Company, Bridgeport, Conn.

DELTABESTON WIRE

GENERAL ELECTRIC

DELTABESTON MAGNET WIRE

MERCHANDISE DEPARTMENT • GENERAL ELECTRIC COMPANY • BRIDGEPORT, CONNECTICUT

©CIB 79125

Electrical Manufacturing

Production - Marketing - Administration - Repairing

Volume 5 JUNE-1930 Number 6

What NEMA Did at Hot Springs

A record attendance of 450 was registered and 50 meetings were held by the various sections, groups, divisions and committees. Here are a few of the outstanding accomplishments briefly explained

GENERAL policies, commercial problems and standardization were the main topics covered in the Spring Meeting of the National Electrical Manufacturers Association which was held at The Homestead, Hot Springs, Va., May 16-23. A record attendance of 450 was registered and fifty meetings were held by various Sections, Groups, Divisions and Committees.

At a meeting of the Policies Division general electrical industry problems were discussed, including relations between major and minor manufacturing companies and between manufacturers and utilities. (See report on pages 28 and 29.) There was discussion on firm price policies, market levels, sales plans, reciprocal purchasing agreements, controlled jobber outlets, industry regulations, standardization, local vs. national marketing, development costs, and so on.

To Participate in I. E. C. Meeting

DECISION to participate in the June meeting of the International Electrotechnical Commission at Stockholm was made by the Board of Governors. It was agreed to continue representation on the present U. S. National Committee of the I.E.C. for several months pending further steps in formation of the general electrical standardization committee which has been proposed for handling all national electrical standards and for making all contacts with foreign and international standardizing bodies.

Bureau of Standards Certification Plan

THE Bureau of Standards plan for manufacturers' certification that their products meet the requirements of the Federal Specifications Board, was discussed by the Policies Division. The proposal was deemed worthy of careful study to determine its possible effects on well established brands, possible misuse of the plan since it provides no check on compliance with the specifications, and possible removal of incentive to make better products than required by the specifications.

Voltage Ratings for A-C Equipment

ONE of the important subjects discussed by the Standards Committee was that of employing a single preferred voltage rating for all a-c equipment. The Committee definitely recommended that no higher normal operating voltage than the rated voltage as given in the NEMA-NELA Report on Preferred Voltage Ratings appear on the nameplate.

A joint Sections Committee was appointed to develop standard dimensions for a small heating appliance plug. A definition for the term "Trip Free in any Position" as applied to oil circuit breakers was formally approved. A joint committee with A.E.R.A. was appointed to standardize package sizes of overhead trolley line material. Two standards on tolerances for diameter and length of laminated phenolic rod were approved. The tolerances are to be the same as previously adopted for tubing. The proposed NEMA-NELA dimensional standard for extra heavy duty terminal lugs was distributed to interested individuals.

Refrigeration Code

THE A.S.A. Electrical Refrigeration Code was approved by the Casualty and Fire Prevention Committee which approval followed the majority vote of the Refrigeration Division taken at a former meeting. The committee also expressed agreement with the National Fire Protection Association's decision May 14 that the brochure on Mechanical Refrigeration recently prepared by the Committee on Gases should be considered a progress report rather than a tentative standard.

Approval of the committee was given on the action of the Signaling Apparatus Section of NEMA at the N.F.P.A. meeting on May 14 (see page 72) when the Section presented a plan for standardizing and classifying fire detection and watch service systems and securing their appropriate recognition by fire protection and insurance rating bodies.

(*Concluded on page 72*)

Relations Between Major and Minor Companies in the Electrical Industry

The Viewpoints of Both as Given at the NEMA Meeting

INTERESTING and profitable discussion developed at the executive session of the Policies Division, following the reading of two sets of papers. One set headed, "Relations Between Major and Minor Companies" consisted of a minor company viewpoint and a major company viewpoint.

G. C. Thomas, Jr., P. O. Noble and F. W. Jessop "in conference" at Hot Springs

Similarly the other set was made up of a paper on the "Relations Between Manufacturer and Utility" from the manufacturer viewpoint and another from the utility standpoint.

The anonymous author who took the minor company's viewpoint offered his observations, as did each of the speakers, with entire good-will and purely with the desire of developing solidarity in the industry and of promoting free and open competitive markets where the determining factors will be merit, good-will, salesmanship, engineering, quality and service.

He pointed out the various barriers which exist within the industry to impede the free, unrestricted, national distribution of a standardized product. Some of these are in the nature of natural advantages accruing to the large or the small company as the case may be and others are what he terms "artificial barriers."

One of these artificial barriers emphasized is reciprocal agreements—the use of purchasing power and traffic tonnage to influence the purchase of electrical products.

On the other hand no objection at all could be found to those natural advantages of the major companies such as, greater general goodwill and recognition, broader business and financial contacts, the ability to finance comprehensive research programs, complete lines of product, and owned or controlled jobber outlets.

THE pensive gentleman at the left is H. W. Young, snapped while thinking out an editorial for "The Delta Star." The other sunburn-getters are H. H. Rudd, E. H. Jacobs, A. C. Streamer and N. J. Conrad

On the subject of jobber outlets no fundamental objection can be brought forward to the advantages in this direction of the major companies but merely to the use to which this power is put. In the case of chain jobbing houses the executives of some of the minor companies merely ask that each product whether purchased from an independent manufacturer or from the company having ownership or control bear its proper share of overhead and furnish its share of the profit.

Much commercial confusion now exists because resale outlets do not maintain the established schedules and sales policies of the manufacturers whom they represent. One means of correcting this practice is Federal resale price maintenance legislation. It is felt that by active promotion, such legislation of a desirable character could be enacted.

Another point which was emphasized was the desirability of having sales policies and sales plans simple, definite and easy of interpretation and administration. And since each minor company must naturally mold its individual sales plan and sales policies to those which have been introduced by a predominating market leader, it is desirable that the major companies set the proper example in this regard.

Quantity discounts also came in for discussion.

The Anonymous author of the paper taking the major company viewpoint took the view that after all there are no vital differences of opinion or of practice. And he made the interesting and significant observation that we have passed from the field of self-protection to the field of self-advancement.

In any competitive relation misunderstanding is possible and from time to time certain, but the point was made that the danger is in permitting it to exist, for if it does it grows, engendering distrust and there results the inevitable product —destructive competition. And all concerned are the sufferers. The possibility of such misunderstanding increases with disparity in the size of the competitive units involved.

The major companies fully appreciate that their business cannot remain healthy if the industry in general is not healthy, and that every effort must be toward general health rather than temporary advantage.

To offset the natural advantages enjoyed by the major company there are compensating advantages accruing to the smaller company. That this is so is evidenced by the fact that the smaller producer is born, lives and grows.

(*Concluded on page 72*)

Relations Between the Electrical Manufacturer and the Utility

As Viewed from Both Standpoints at the Hot Springs Meeting

THAT the manufacturers and the utilities not only can but must formulate a uniform policy is the belief of the anonymous author of a paper taking the utility viewpoint.

He takes the stand that any failure to cooperate is reflected in added costs and in the character of service and constitutes a retarding element to fullest utilization of electricity.

According to this man's view the utilities appreciate and sympathize with the desire of manufacturers to utilize a standardization program for the simplification of their product, to procure uniform recognition of nationally standardized products, and under these conditions to realize the benefits of mass production thus rendered possible. The utilities welcome this program in the main, but have dissented to certain details of execution.

For instance, in the first place the utilities have objected to that phase of the manufacturers' program which appears to contemplate that the electrical market is an undiscriminating market wherein standards may appropriately be set by producers alone.

The second important point at issue is in what the utilities conceive to be a most unfortunate support of regulatory projects which would achieve simplification in production at the expense of excluding many possible ways of complying with the actual necessities, namely protecting life and property. Many otherwise commendable projects have been condemned by the utilities when manufacturers have attempted to reach their objectives by means of the codes, standards or other regulations that bear, with more or less the force of the law, upon the subscribers of the utilities.

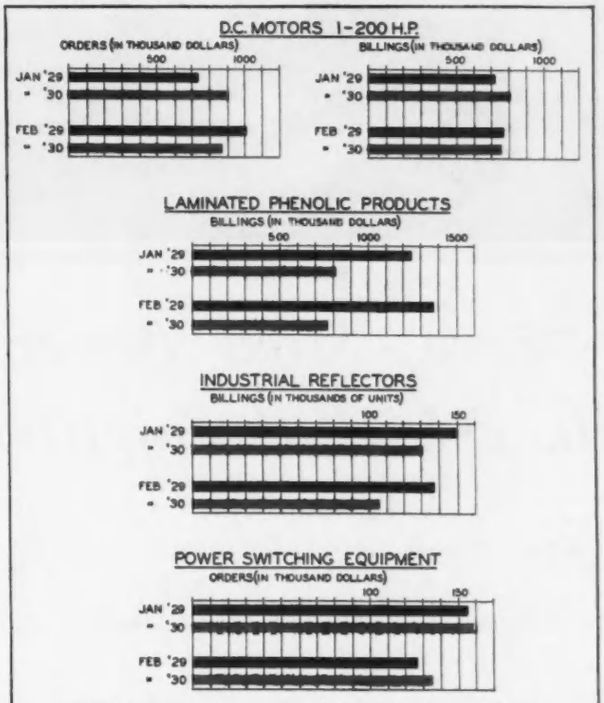
And third, there is the commercial problem of the utilities in the development of their load. The outstanding problem of the utilities is increased sales of electricity. One of the most important elements in promoting this objective is that there shall be available wiring installations and current consuming appliances in adequate variety and in a range of prices to suit all purses. The utilities cannot be expected to make costly effort to sell expensive things when in their judgment cheaper things are adequate for the purpose.

The author, who took the manufacturer's viewpoint, stressed the importance of the general public acceptance of electricity and its uses, and the necessity that both manufacturer and utility work toward that public acceptance to a greater degree.

He pointed out that where there was a divergence in the views of the manufacturer and the utility this was often due to the fact that central stations are not competitors of one another, but manufacturers are. Each manufacturer must meet competitive conditions and cannot do many things that some utilities desire. The manufacturers are under necessity of standardization to meet the average market and they are greatly hampered if they do not have uniform acceptance conditions, or if there are local restrictive ordinances.

The utilities seldom realize the very heavy investment in tools and dies which are highly necessary to produce in large

(*Concluded on page 72*)



THESE are a few selected from a group of interesting statistics gathered by NEMA. In the case of the DC Motors, there were 17 *companies reporting last year and* 16 *this;* 8 *companies reported on Phenolic Products;* 5 *on Industrial Reflectors; and* 11 *on Switching Equipment*

GOLF was taken up by a committee of the whole! A few of the "members" from left to right are C. A. Bates, H. J. Mauger, T. D. Halliwell, D. E. Worrell and Frank Jones

"Even a Screw Driver Fills Me With Suspicion"

A. Edward Newton

Chairman of the Board, I. T. E. Circuit Breaker Co.,

Book Collector and Author

A Personality Sketch by Chapin Hoskins

TWO names in electrical manufacturing are known, in America and abroad, to more people outside the electrical industry than in it. These two, obviously, are Thomas A. Edison and Owen D. Young.

There is also a third.

How many readers of this magazine know of an electrical manufacturer whose books are literally read to pieces in public libraries? Whose writings are sought for and bought at a premium by collectors of rare books? Who receives so many letters from readers of his books that he is obliged to answer many of them with printed slips of acknowledgment?

Many in the industry know A. E. Newton (pictured at the left above) as Chairman of the Board, The I-T-E Circuit Breaker Company.

But "wherever book collectors gather, at auctions, in clubs, in private libraries, or anywhere else in America or England, the name of A. Edward Newton is known"—says a writer who has published one book about Newton and another about Newton's books.

It was in 1918 that the Atlantic Monthly Press ventured to publish a book on a subject which at that time was of interest to but few people, by a writer whose name was known to fewer still. *The Amenities of Book-Collecting and Kindred Affinities*, the book was called.

"Three thousand copies," said the publishers, courageously, to their printers.

It is a reasonable guess that at the time not 3000 people in the United States had ever used this word "amenities" in natural conversation. And book collectors were nearly as rare as the books for whose possession they competed.

Actually, not 3000, but 30,000 copies of *The Amenities* sold before public interest began to lag. If today you want one of those 3000 first copies, you must pay its original price 20 times over—more than you would for many of the first editions of such famous American authors as Mark Twain or Longfellow.

Say *The Amenities* to the bookwise man or woman today, and it means but one thing: A Edward Newton's book.

It has "made more book-collectors than all other books on the subject put together—any book collector will tell you so," says George H. Sargent, the enthusiast whom I have already quoted. "It started a lot of people, including captains of industry, into the collecting of books. . . ."

Subsequent A. Edward Newton books have strengthened the bond between this manufacturer-collector-author and his public. Fourteen published books, 17 introductions to the books of others, 21 of the "souvenirs" he sends to his friends at Christmas, are listed in Sargent's Bibliography. And, besides, 21 *Newtoniana*—books and articles about A. Edward Newton.

If you like books at all, pick up a copy of *The Amenities* some day, and you will discover quickly enough the source of its popularity. When Christopher Morley says that A.

Edward Newton is "a natural born genius in the art of the familiar essay," he tells but half. Morley touched a more vital spark when he said of Newton that "he has in high degree the fertile gift of making everything associated with him, however trifling, seem of exciting import."

Please note that word "exciting." It has something to do with Mr. Newton's success in electrical manufacturing, too.

What kind of a man is this A. Edward Newton? Scholarly, to the degree that his knowledge of such matters as the life of Dr. Samuel Johnson and the first editions of Dickens' *Pickwick Papers* is unequaled; yet quite the reverse of pedantic. Genial, to those who find him so. Crabbed, one gathers, to those who cross him; but delighting in being "called" for it by one who really understands the amenities. Distinctive in his learning, distinctive in his clothes, distinctive in his conversation. Disconcerting, often, in his actions.

Christopher Morley speaks of "the violence of his (Newton's) chequered suits, the highly cherished ribaldries of his casual talk, his equally decisive affections and aversions. . . . He is more combustible than most people. Every valve in his engine is working at full go. . . ."

* * *

But—this man who causes others to take up book collecting by the force of his own enthusiastic example; who is one of two or three leading authorities on the life and affairs of that erudite individualist of another century, Dr. Johnson; who has paid the highest price on record for a first folio Shakespeare; whose books are "read to pieces" in public libraries—what kind of an electrical manufacturer is he?

Not much, if you believe the man himself.

Listen to his own story of how it all happened. He worked, once, for Cyrus H. K. Curtis, at $3 a week. He clerked in a bookstore. He was with Brown Brothers & Company, bankers—"the unhappiest time of my life. I can imagine nothing more miserable than to spend the best part of one's life in counting money, especially the other fellow's money." He went into business for himself, and then—

"After some years, when I had accumulated a little money, a man, thinking I had much, called on me with a view to selling me an interest in an electrical business. I was told that what was needed was a financial manager; and when upon investigation I discovered that the business was in the hands of the sheriff, I knew that I had not been deceived.

"In time I became the president of an electrical manufacturing company, without knowing a volt from an ampere, or a kilowatt from either. By the happiest kind of a fluke I came to have a name not quite unknown in electrical and financial circles, although nothing of an electrical engineer and very little of a financier."

That beginning as a financial manager was in 1895. Thirty-five years ago. Cutter Electrical and Manufacturing Company, now called The I-T-E Circuit Breaker Company, and no longer of interest to the sheriff, has become known the world over. Yet this is what the man most responsible for the transformation says of himself:

"When I sometimes so far forget myself as to talk of eddy currents and hysteresis, I see that I deceive no one. . . . I am known to hate every living mechanical thing with a royal hatred—even a screw-driver fills me with suspicion, and a monkey wrench with horror."

Now one simply cannot imagine this man who does with such contagious enthusiasm the things he likes to do, staying for 35 years in a business he couldn't be enthusiastic about.

He is certainly not an electrical genius, nor was he technically trained.

But other qualities, plus what might be termed "electrical common sense," can build a business.

One of these qualities, shall we say, is that ability, too rare in engineers, of kindling the spark of enthusiasm in the breasts of those about us.

Another is the gift of being enthusiastic about the individuals themselves, who work with us, and by so doing, to multiply their self respect, their interest in the job, their constructive loyalty to the company and its products.

That Newton has this gift, there is plenty of evidence. Remember what Christopher Morley said about his ability to make things "of exciting import."

After dedicating *The Amenities,* charmingly, to his wife, Newton inscribed his second popular book, *A Magnificent Farce,* in this fashion:

"To
WILLIAM MAXWELL SCOTT

For over twenty-five years we have been yoked to the same plough, and if we have kept the furrow straight, it is because we have pulled together."

William Maxwell Scott, now president, was at that time chief engineer, and one really need not look beyond this dedication by Newton for the secret of this non-electrical manufacturer's electrical manufacturing success. Not knowing electricity himself, he has known how to pull together with those who do.

But the teamwork, we may be sure, is not of two men alone.

Three years ago some of you who read this received from The Cutter Company a small book called *Experience Is Master.* You thought it, perhaps, just a brief to convince you of the quality of Cutter products. But the method it took was to show you, one by one, in photograph and biograph, executives and old employees who make Cutter products what they are.

For instance:

"WALTER CHAMBERLAIN—1896

'Walter,' as he is affectionately called by everyone, is Superintendent in charge of the entire Cutter Machine Shop, a domain as important as it is extensive. His long experience with the Company—this being his thirtieth year—his unusual knowledge of machinery, his disposition, tact and understanding of men, are responsible for the position he now holds. To the genius of Walter Chamberlain we can attribute in no small degree the development of the unusual abilities of many of the men who work with him. And these men, working together as an efficient organization, construct equipment that is equalled nowhere else in the field. Standing at Walter's desk is Edward A. Olsen, one of his able assistants.

"CONRAD WILSON—1903

Conrad Wilson came to us from Norway, the land of highly trained mechanics, to whom thoroughness is second nature. With this background, supplemented by 23 years of Cutter training, Wilson is just the kind of man to successfully carry through the assembling of exceptionally heavy, or unusually intricate apparatus."

Undoubtedly, *Experience Is Master* did tell the Cutter quality story successfully to Cutter prospects. But its greater effect, I will wager, was its direct influence on the actual further attainment of quality in the company's manufacturing operations. Recognition of good work already done is ever the greatest spur to better work—by the same people and others—in the future.

A. Edward Newton wrote the book, of course, and if you have one, hang on to it. An earlier booklet of the same character, *Who's Who and What,* published in 1907, is

known to book collectors as the rarest of Newton items; and desired accordingly.

In the earlier book you will find the touch of Newton's genius in his definition of the company's purpose:

"To create and maintain a reputation; to build a piece of apparatus which the whole round world admits to be the best of its class; to create a world standard and keep it at a level unapproached by others."

And in the later one he remarks: "Many years ago we adopted as our ideal: The circuit breaker art of the world is to be what we shall make it."

If the ability to set such a standard before an electrical organization and maintain group and individual devotion to it across a third of a century is not good manufacturing management, I don't know what is. Add to it the successful direction of finances in a business that had flirted with the sheriff, and you have evidence enough that A. Edward Newton is something more than a book collector, an essayist, an authority on Dr. Johnson, and a boon comrade to those who share his bookish enthusiasm and learning.

Whether he really is so unversed in matters electrical as he would have us believe, I leave the reader to infer from this description of himself in *Experience Is Master:*

"The policy of a business may be directed—as a baseball game can be played—from the bench, by a man who can neither bat nor run. Mr. Newton, in the picture—wearing checks that have frequently been protested—is seen listening to details which he hardly understands; but he will carry from the conference knowledge sufficient for his purpose."

* * *

"My life has always been a singularly duplex affair," says Newton in his *A Magnificent Farce.* "One-half of it—no, much more, nine-tenths of it—has been hard work, the rest of it has been spent in my library."

The real peculiarity of Newton's life is that it has been duplex in another way, too In business, he has expressed himself through others. In books, his own personality comes onto the printed page.

It is the colorfulness of this personality that has made him a world-wide figure. In business the full expression of the same personality would merely set him down as "queer."

I once asked a number of manufacturers some questions about how best to make 1927 a prosperous year. Charles Edison wrote me about budgeting. S. Duncan Black, of Black and Decker, about forecasting and budgeting. The late Leonard Tyler, of Acme Wire, about research. A. I. Appleton, of Appleton Electric; George A. Hughes, president of Edison Electric Appliance Company; W. A. D. Evans, president of Cooper Hewitt; about other phases of industrial management.

Not so I-T-E's Chairman (then president.) His answer:

"The thing most necessary is to keep politics out of business. Why is it, I ask you, that the average business man holds his breath—and his nose—while Congress is in session?"

To say the least, those who have known A. Edward Newton in business undoubtedly know what he likes and what he dislikes. When he has held his nose, they have been aware of it.

But aside from his close business associates, those who really know this man are his readers. And they, in their thousands, know him more intimately than readers usually do know authors. To them he confesses his foibles, boasts his triumphs, admits his discomfitures. It is they who know how to smile with him; to gloat, with him, over the discovery of treasure in books and in human beings; to enjoy, with him, the amenities of life.

It is they, the booklovers of the world, who will claim A. Edward Newton when the electrical world has forgotten him.

Yet when I reread those gems of industrial literature in which he has defined his company's standard of quality; when I thumb the pages on which he tells, humorously and affectionately, of those who work to uphold that standard, I am not at all sure that the most successful half of this duplex life of A. Edward Newton has not been the nine-tenths-"half" devoted to electrical manufacturing.

How to Manufacture Coil Wedges

By F. S. WHEELER
Westinghouse Elec. & Mfg. Co.
East Pittsburgh, Pa.

BECAUSE wedges that are used to hold coils in the slots of motors and generators must be made accurately, and because there are a large number required for each machine, the method of manufacture is important from the standpoint of cost and production

PRACTICALLY all electric motors and generators make use of an insulating coil wedge to hold the coils in the slots and prevent relative movement which would damage the coil insulation. Wedges have been made from many different materials, such as wood, Micarta, fiber, etc., but hard fiber seems to be the most practical material from the standpoint of its physical characteristics, machining qualities, and its serviceability.

One of the most exacting requirements is that the wedges shall drive into the slots with a tight fit and not loosen under operating conditions. The wedges should be machined so that they can be driven into the slots with a moderate hammer blow, advancing an inch or so with each stroke. The slots are necessarily somewhat rough and the

wedge material must shave off or compress slightly, when being driven past a rough edge or lamination. The material must therefore be resilient and strong to drive well and follow through the slot without buckling or shattering.

Sheet fiber of good quality, having a density of 1.35 to 1.4 and a moisture absorption of not more than 13 per cent in water for 4 hours, is satisfactory if it has the proper machining qualities. This is based on fiber from 3/32 to 5/32 in. thick. Thinner material, used in small machines, would have a lower density and necessarily a higher moisture absorption. Thicker material should have about the same density with moisture absorption of 11 per cent or less. Hard fiber of this sort should have a tensile strength of about 13,000 lb. per sq. in., a shearing strength of 8500 lb. per sq. in. and a transverse strength of 18,000 lb. maximum fiber stress.

Since wedges must be made accurately and a large number are required for each machine, the method of manufacture is important from the standpoint of cost and production. Fiber is made in sheets about 40 to 44 in. by 6 to 7 ft. long. For making wedges, these sheets may be cut into strips about 8 or 10 in. wide and then run through a gang slitter, which cuts the material into narrow strips of the width required for the wedges, allowing about 1/32 in. for final machining. These strips should be stored to condition, if they do not have the proper moisture content, which should be 5 to 5½ per cent. Then they may be cut to fit the wedge grooves on what is termed a draw bench.

The draw bench consists of a long table on which is mounted a traveling chain for carrying a "dog." On one end is mounted a double cutter which is ground to give the exact shape to the wedge. The two halves of the cutter are spaced to cut the wedge to the proper width, allowing approximately 1 per cent for shrinkage when drying the fiber. The long strips are milled at one end for about 5 in. so that they will pass through the cutter far enough to be caught by the jaws of the "dog" and pulled through the tool. After machining to wedge shape, the long strips may be cut into lengths suitable for the machine, oven dried at about 100 deg. C. for 16 to 20 hr., and finished with a moisture resisting coating, such as paraffin or vaseline. The wedges should then be wrapped and stored in a dry place until used.

Fiber should be stored prior to fabrication in a well ventilated room on a platform at least 8 in. from the floor. For coil wedge material, the room should be maintained at about 60 per cent relative humidity, giving the fiber a moisture content of about 5½ per cent. Satisfactory results can be obtained with a storage space having a wide range of humidity, providing the material can be conditioned to about 5½ per cent moisture content in another room previous to machining. This is important when making wedges as the material shrinks about 1 per cent for each 3 per cent change in moisture content of the fiber. Variations in moisture content due to improper storage could easily produce a variation of 6 to 8 mils in ¾-in. wedges, making them unsatisfactory for use.

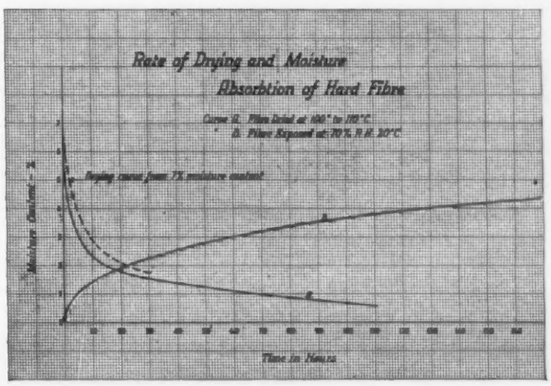
For some machining operations, a moisture content of 6 to 6½ per cent is recommended and the fiber should be

(*Concluded on page* 74)

FIBER is made in sheets about 40 to 44 in. wide by 6 to 7 ft. long. For making wedges these sheets may be cut into strips about 8 to 10 in. wide and then run through a gang slitter, which cuts the material into narrow strips of the width required for wedges, allowing about 1/32 in. for final machining

WEDGE strips are cut to exact fit on a draw bench, consisting of a long table on which is mounted a traveling chain for carrying a dog and on one end of which is mounted a double cutter ground to the size of the wedge groove

FIBER from which wedges are made should be stored prior to fabrication in a well-ventilated room on a platform at least eight inches from the floor. This curve shows the rate of drying and of moisture absorption of hard fiber used for making coil wedges



Shall We Weld It or

STEEL used in arc-welded construction is stronger and less expensive than cast metal, and when joined by the electric arc the joints are as strong as the parent metal. The use of steel also permits the required strength to be built into a product with less metal and without the preparation of patterns.

SINCE the introduction of electric arc welding as a means of fabricating structural and mechanical designs, this process has progressed so rapidly that today it can be found in practically every industry. It has replaced practically every known process or method of fabrication and has even caused the redesign of products so that manufacturers may avail themselves of the superior physical qualities of designs produced with this process, as well as the economy it affords.

The superior physical properties and economy afforded by arc welded construction are due to the fact that it utilizes rolled steel rather than cast metal. Steel is stronger and less expensive than cast metal, and when joined by the electric arc the joints are as strong as the parent metal. The use of steel also permits the required strength to be built into a product with less metal, and requires less preparation, such as making patterns, pattern drawings, and casting the design.

The two machinery bases shown in the accompanying illustrations, one of cast iron construction and one of arc welded steel construction, both designed for identical purposes, will serve to compare these two methods of fabricating this type of design. These bases are designed for a small pump and motor. They are identical in size, loading and deflection. The size is 12"x30"x3" and the load consists of the weight of the pump and motor. There is no power take-off from the bases.

The base shown in the drawing on the opposite page is fabricated of cast gray iron which has a section area of 8.5 square inches. The base in the drawing on this page is fabricated of structural steel angle and flat bars, with a section area of 2.38 square inches. The unit stress in extreme fibre (tension) of the cast base is 2000 pounds per square inch; that of the arc-welded base is 4300 lb. per square inch. The enormous difference in unit stress is due to the fact that steel is six times as strong in tension as cast iron. The moment of inertia of the cast iron base is 5.39, whereas that of the arc welded base is only 2.18. The distance to the neutral axis from the extreme fibre of the cast base is 2.308; and for the welded base, 2.01. The cast base weighs 85 pounds and the arc welded base 37.8 pounds. All figures have been determined by means of the common formulas.

The procedure and requirements of cast construction are generally well known, hence it will not be necessary to give a detailed description of the manufacture of the base sketched on the opposite page. The construction of the modern base of arc welded steel, shown on this page will undoubtedly prove of interest to machine designers.

The welds at the corners of the arc welded steel base are subjected to a load of 4300 lbs. per sq. in. at the extreme fibre. It is assumed that the tension on these welds is 4300 lbs. per sq. in. for a distance of 1 inch upwards from the extreme fibre; this is not a true condition as the tension diminishes at each point upward from the extreme fibre. The thickness of the angles at the weld is ¼ inch. Therefore, the pull or tension on the weld is 4300 lbs. or 1075 lbs. Reference to the following table shows that a 3/16" full fillet weld will safely withstand the load of 1075 lbs. and is ample to join the members of the base.

$\frac{4}{4}$

The following practical and safe values are used for shear and for tension:

3/16" Full Fillet Weld—1,500 pounds per lineal inch
¼" Full Fillet Weld—2,000 pounds per lineal inch
3/16" Full Fillet Weld—2,500 pounds per lineal inch
⅜" Full Fillet Weld—3,000 pounds per lineal inch
½" Full Fillet Weld—3,500 pounds per lineal inch

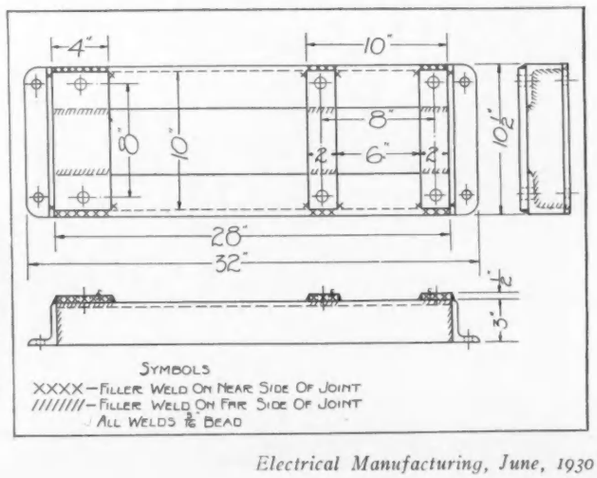
For welds in compression, values 20 per cent above those given in the table may be used.

The following is a list of the material used in fabricating the arc welded steel base sketched on this page.

Part Shape and Size	*No. Required*	*Location*	*Length per Piece*	*Weight lbs.*
3" x 2" x ¼" angle	2	Ends	10½"	7.2
3" x 2" x ¼" angle	2	Sides	28"	19.2
4" x 10" x ½" Flat bars	1	Pad (pump)	10"	5.7
2" x 10" x ½" Flat bar	2	Pads (motor)	10"	5.7
Total No. of Pieces	7	Total weight.....		37.8

THE machine base shown in this drawing has been designed for fabrication by the use of arc welding. On the opposite drawing is shown a machine base designed for casting for exactly the same application

Steel used in arc-welded construction is six times as strong in tension as cast iron, and the moment of inertia of the steel base is less than half that of the cast iron base



t or Cast It?

By A. F. Davis
Vice-President, Lincoln Electric Co.
Cleveland, Ohio

Preparatory to assembly the corners of the end angles are ground to suitable radius as shown in drawing. Where appearance is not important the corners of the end angles may be left square, thus eliminating grinding operation which will reduce the cost. The flat bars which form the pads for pump and motor are machined before assembly, though this machining is generally unnecessary due to the smooth surface of rolled steel.

The parts are placed upside down in a fixture or jig. The various faces of the base formed are lined up properly in the jig and the pieces then clamped securely ready for welding. The essential welding is done on the underside of the base so that the welds are concealed when base is in normal position.

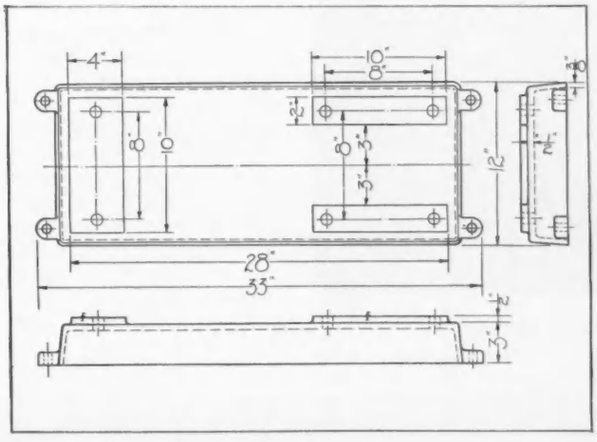
The following tabulation shows the number of lineal inches of arc welding necessary to make each connection:

Arc welding end angles to side angles	
4 fillet welds at 5″ each	20″
Arc welding flat bar (pad for pump) to angles	
2 fillet welds at 4″ each, 8″	
2 fillet welds at 6″ each, 12″*	
—	20″
Arc welding flat bars (pads for motor) to angles	
4 fillet welds at 2″ each, 8″	
4 fillet welds at 4″ each, 16″*	
—	24″
Total of lineal inches of 3/16″ fillet welds	64″

*These welds are not essential, but may be necessary to promote customer's confidence in strength of base.

EIGHTY-FIVE pounds is the weight of the cast base, whereas the welded base weighs 37.8 pounds. The distance to the neutral axis from the extreme fibre of the cast base is 2.308, and the welded base, 2.01

The making of patterns and pattern drawings and the processes of molding and casting are eliminated when the arc-welded fabricating method of construction is used



COMPARISON OF COSTS

For Cast Iron Construction

85 lbs. C. I. at 6c	$5.10	
Drilling, grinding and machining	1.50	
Total cost of cast iron base		$6.60

For Arc Welded Steel Construction

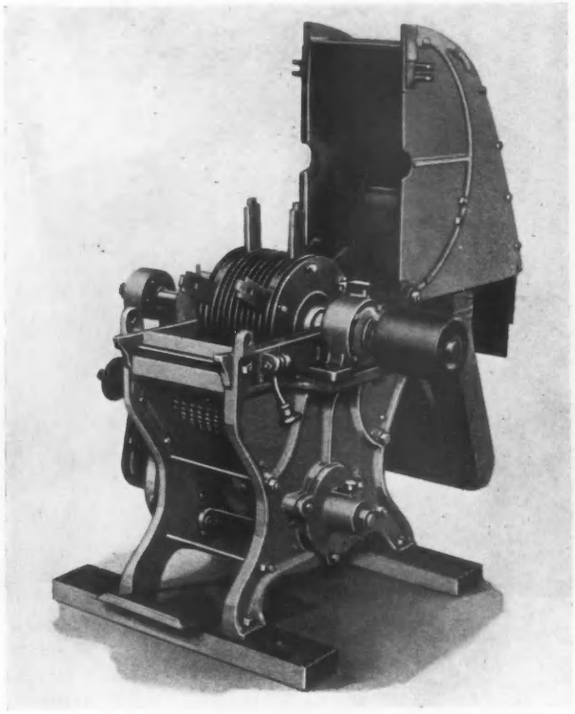
26.4 lbs. angles at 3c	$0.79	
11.4 lbs. flat bars at 4½c	.51	
37.8 lbs. structural steel	$1.30	
5′4″ welds at 25 ft. per hr	0.22 hrs.	
Set up fatigue	0.18 hrs.	
Total welding labor at $1 per hr. for 0.40 hrs.	.40	
Electrodes and power consumed	.30	
Cutting steel to size	.15	
Drilling, grinding and machining	.75	
Overhead	1.25	
Total cost of arc welded steel base		$4.15

The arc welded steel base is lighter than the one of cast construction, yet its physical qualities are superior, and the cost of manufacturing was less. It is lighter because steel is six times as strong as cast iron, therefore less material was required. Steel is also cheaper than cast iron and therefore arc welded base was manufactured at a saving of $2.45, or more than 37 per cent of the cost of the cast base.

The prices used in calculating the cost of the welded base are based on warehouse prices, but for a concern large enough to buy direct from the mill, the cost of the steel would be reduced and the cost of fabricating the arc welded base even less.

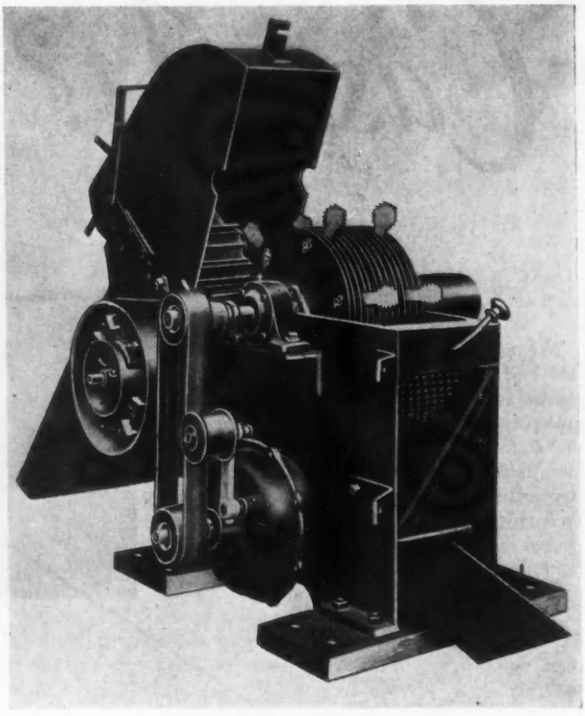
These advantages are indicative of what may be gained in the fabrication of machinery bases by use of arc welded steel construction instead of cast construction. Heretofore cast construction has been looked upon more or less as the correct means of producing machinery bases, however, the examples shown above would seem to indicate that this is no longer true.

Another advantage of arc welded construction is that it will withstand extremely rough usage. Whenever a machine is subjected to heavy loads or rough usage its frame must be strong enough to withstand a pressure somewhat greater than



A Cast Iron Mill

THIS shows the machine as it used to be built—of cast iron construction. It was redesigned for arc welding to secure greater strength, increased capacity and longer life



Redesigned for Arc Welding

THIS shows the mill as it was redesigned for arc welding. The side frames, cover and chute are fabricated of standard steel shapes joined by the arc welding process

that exerted by the machine in service. For this reason the frames of large, heavy duty machines are very often of necessity large and cumbersome when constructed by the traditional method of casting. Where the frame is built of arc welded steel, however, the metal can be placed exactly where it is needed, and in the correct amounts, thus securing the needed strength in the most compact form.

The automatic stamping machine, shown at the bottom of this page is an excellent example of the advantages of arc welded steel construction of this type of machinery. This machine was built to order by the Southwark Foundry & Machine Co. of Philadelphia, Pa., and produces stampings at the rate of 200 per minute from strip steel. Should the machine jam, for any reason, the slugs would pile up under the dies and subject the frame to very heavy loads and shocks. The type of construction illustrated prevents breakage of the frame should such an accident occur.

The frame of this machine is constructed of 3-in. plate in the main members and 1½-in. plate in brackets and pads. The weight of this frame is 6700 lb. It is fabricated completely by arc welding.

The machine, shown above at the right manufacture by A. M. Dellinger of Lancaster, Pa., was formerly built of cast iron, as shown at the left above, but was redesigned for arc welding to secure greater strength and increased capacity, and, incidentally, longer life through the reduction of the possibility of breakage. The strength and rigidity were increased by replacing the cast iron parts with those of arc welded steel. The side frames, cover and chute of the new model mill are fabricated of standard steel shapes joined by the arc welding process. On the inside of the machine the sieves, balance rotors, bearing brackets, and braces are arc welded in place.

The elimination of drawings, patterns, molding and castings, also a reduction in the amount of machining required, all contribute to the savings effected by the use of arc welded steel construction in this modern mill. This saving in manufacturing costs makes it possible for the manufacturer to incorporate additional mechanical features in the mill not contained in its cast iron predecessor. Since the capacity of this mill was also increased, it is evident that the economy of arc welded steel gives the buyer greater value per dollar, without reducing the manufacturer's profit.

Cast construction has long been regarded as the correct means of fabricating metal designs, but arc welded construction is rapidly replacing casting.

Arc-welded Stamping Machine

BUILT to order, this automatic stamping machine produces stampings at the rate of 200 per minute from strip steel. Should the machine jam, the slugs would pile up under the dies and subject the frame to very heavy loads. Arc welding prevents breakage

Asphalt Composition *vs.* Hard Rubber *in Battery Jars*

In this frank statement made at the Spring Meeting of the National Battery Manufacturers Association, Mr. Shank brings out some of the relative merits of these two materials in such a way that they should interest other manufacturers than those making only storage batteries. Turn also to the article on hard rubber on page 47

By McConnel Shank

B. F. Goodrich Company

TWENTY years ago all storage batteries not in glass were assembled in hard rubber containers, but in those days we called them simply "three-compartment jars." They were built up by hand from calendered sheets of rubber in much the same manner as single compartment jars.

In those days it was a question of single jars in a wooden box, three-compartment jars in a wooden box, or heavier three-compartment jars without a wooden box. In fact, there were a lot of questions in those days. We didn't even agree on the name of the thing that "sparked" our automobile engines. Some called them accumulators, others igniters, and others batteries or sparking batteries.

The chief reasons why single jars in a wooden box won out twenty years ago are:

1. The limited development of molding processes and equipment.
2. The limited development of rubber reclaiming.
3. The very high price of rubber itself. In 1910 the price of rubber advanced to $2.90 per pound. That, more than anything else, put three-compartment jars out of business.

Today the price of rubber is around 16 cents per pound and the price of the cheapest reclaimed rubber is about one-third of that figure. In carload lots we sell rubber containers at about 8 cents per pound, and asphalt containers at about 6 cents per pound. Furthermore, at these prices we pay the freight, except for long hauls, and allow cash discount. You can see from this that, in order to make any profit at all, we have to get our factory cost down to a very low pound basis. I do not have access to the profit and loss statements of our competitors, but there are a lot of us making rubber and asphalt containers, and I venture the opinion that, if we figure our depreciation as we should, more of us are showing a loss than making a profit.

Jumping down to the present time, the question is—hard rubber containers or asphalt containers, or both, to what extent? Let us consider these two kinds of containers on the basis of facts, about which there can be very little disagreement.

In making these comparisons, I shall divide all containers into two classes, hard rubber composition and asphalt composition. For brevity's sake, I shall call the hard rubber composition "rubber" and the asphalt composition "asphalt." In the asphalt class I include containers made from various kinds of asphalt, pitches, Gilsonite and the like, with the exception of the small percentage containing a very expensive kind of asbestos instead of cotton. Those containing this high priced asbestos are closer to the rubber than to the asphalt, in cost of manufacture.

Furthermore, I confess that I am a rubber man. Some of us rubber men make asphalt containers, but it is only natural that we should prefer to make rubber. Nevertheless, I shall try to be as unprejudiced as possible in the consideration of the various properties of these two kinds of containers.

Strength—Any rubber compound at all worthy of the name is stronger than the best of the asphalts. This is true of tensile strength, which is most frequently considered, or transverse strength, or impact strength, which is most important.

Heat Resistance—Both rubber and asphalt compounds vary somewhat in this property, but the best of both are about equal in resistance to heat. Rubber resists the flaming in assembly better than asphalt.

Acid Resistance—Rubber is distinctly superior in this respect. As far as I know, there is no kind of asphalt that approaches hard rubber in acid resistance.

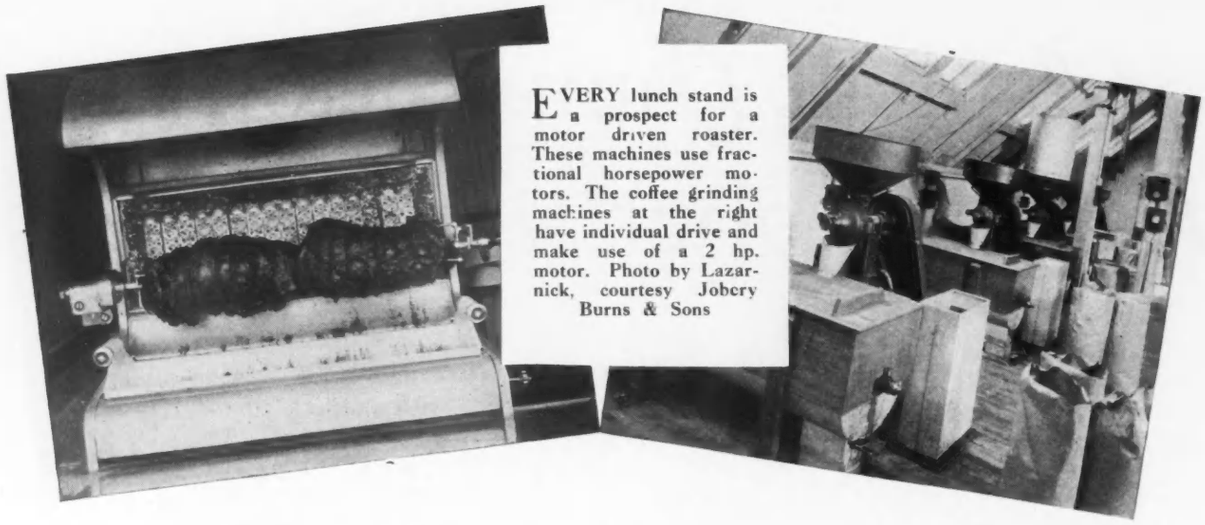
To illustrate this, I refer to the brown flexible single jars, of which millions were used. All of these were colored with iron oxide. When we began to make those jars, some of our customers were much disturbed about the effect of the iron upon the performance of their batteries. To remove all doubt on that question, we made some jars with 15 per cent of iron oxide in the recipe, and in no kind of test along the line of service conditions could our customers distinguish between the jars with 15 per cent of iron oxide and those with none.

In a good hard rubber compound each particle of material other than rubber is so occluded, as the scientists say, by hard rubber, and the hard rubber is so resistant to sulphuric acid, that it is practically a perfect protection.

Of course there is a high percentage of rubber in a recipe for single jars and little or no new rubber in a rubber container recipe. Still the percentage of rubber, second and third generation, in a rubber container is high, and those of you who make tests for acid resistance will agree that the average rubber container is superior to the average asphalt container in this respect.

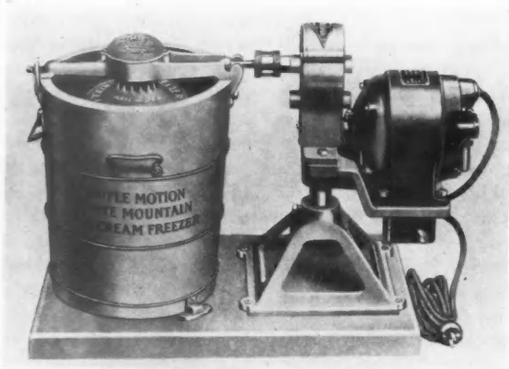
In a rubber container we rely upon the rubber for both strength and acid resistance. In an asphalt container we

(*Concluded on page 76*)



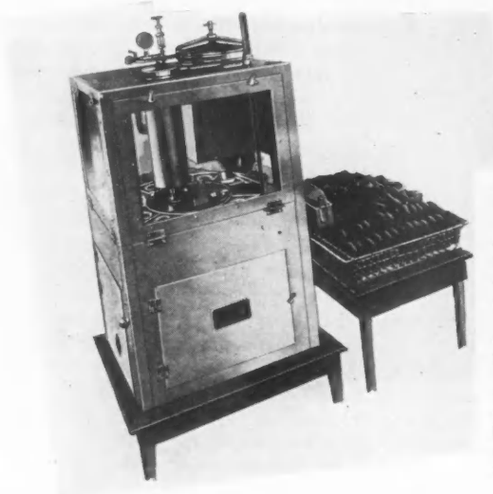
EVERY lunch stand is a prospect for a motor driven roaster. These machines use fractional horsepower motors. The coffee grinding machines at the right have individual drive and make use of a 2 hp. motor. Photo by Lazarnick, courtesy Jobery Burns & Sons

Here Is Another

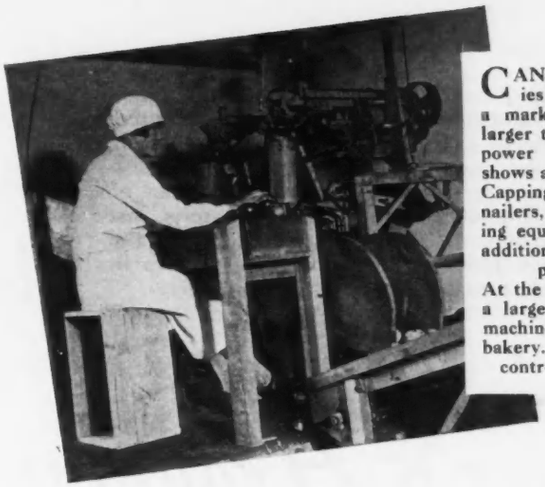


POTATO peelers use motors ranging from ¼ to ½ hp. Three-phase A.C. operation is preferred

THIS mixer uses a ¼ hp. motor, made for A.C. or D.C. A very large market

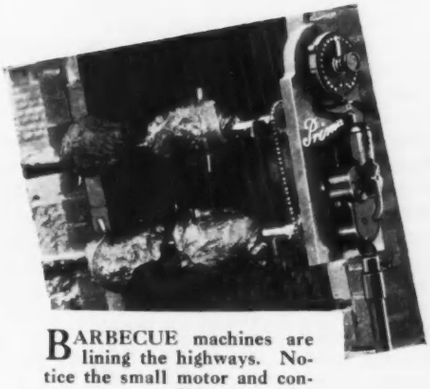


ICE-CREAM freezers, doughnut machines, drink mixers and fruit extractors all suggest a wide market for motors of various sizes. An important trend is the growing use of drink mixers and fruit extractors in the home, which is opening a large market for standardized small motors



CANNING factories (left) furnish a market for motors larger than one horsepower mostly. This shows an apple peeler. Capping machines, box nailers, and conveying equipment furnish additional motor applications.
At the right is shown a large dough mixing machine used in a bakery. Notice the control equipment

Motor Market

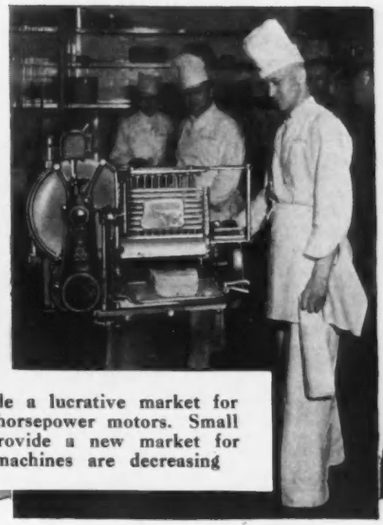


BARBECUE machines are lining the highways. Notice the small motor and controller

Food Machinery

SO vast and various is the market for motors and control in the food machinery field that only a suggestion of it can be given on these two pages. The greater part of this market is for fractional horsepower 110 volts, 60 cycle alternating current motors although in the farm market there is a need for 32 volt D. C. and A. C. motors

A ⅛ hp. motor is used in this kitchen mechanic. Photo by courtesy of Gem Appliances



POP-CORN stands provide a lucrative market for standardized fractional horsepower motors. Small meat slicers promise to provide a new market for motors. Hand-operated machines are decreasing

ON the farm this small portable motor is used for running the separator, freezing cream, etc.

ARTICLE 2—of a series on exporting electrical products to Latin America. The introductory article of this series appeared last month. This month the author tells just how to get dollars-and-cents information from the Bureau of Foreign and Domestic Commerce. He tells just what information to give branch offices of the Bureau so that they can be of the most service in helping form sound export relations.

Let's Get Acquainted

By WILBUR T. GRACEY

Twenty-five years abroad as American Consul

IN the Archivos de las Indies of Seville, Spain, there lie, smothered in four centuries of dust, many maps of little known lands of the New World bearing in the original handwriting of one Christopher Columbus the inscription, "Tierras de ningun provecho," meaning "Lands that are of no value to anyone." To the great mass of our electrical manufacturers these lands have remained, as to the Spaniards of hundreds of years ago, "Tierras de ningun provecho." Only since the war have American manufacturers seriously considered the market possibilities of Latin America.

Even at present we are lamentably negligent in not studying these countries, their trade, the likes and dislikes of this mass of intelligent people—many of them as well if not better educated than ourselves—who make up the seventy-five millions of population.

Gradually we are coming to realize the necessity of familiarizing ourselves with these vast potentialities and are endeavoring to understand the local point of view.

Our investments there are growing. Recent government figures tell us that almost six billion American dollars are invested and now drawing dividends from Latin America.

Year by year our export trade to these countries grows. During 1928 when the total export trade in electrical goods from the United States amounted to 111 million dollars, nearly 27 million went to the 20 republic that we know as Latin America. In 1929, the total exports were 150 millions and the exports to Latin America approximately 34 millions.

Detailed figures by countries for 1928 are:

Argentina	6,952,686
Brazil	4,802,082
Mexico	4,016,036
Cuba	2,586,095
Chile	1,963,802
Colombia	1,761,392
Venezuela	990,886
Uruguay	698,886
Panama	580,644
Peru	515,272
Dominican Republic	325,927
Guatemala	277,706
Costa Rica	210,681
Bolivia	193,304
Honduras	163,544
Ecuador	161,766
Salvador	151,189
Nicaragua	128,972
Hayti	74,685
Paraguay	19,338

This is your potential market. Not only is our trade in electrical goods with Latin America a live one, but it increases rapidly from year to year.

It is not expected that the large manufacturing concerns who have built up a trade of 27 million dollars in these markets will be particularly interested in what the government can do to assist them in getting established. Their foundation is already laid, the trading routes known, their business on a more or less smooth running basis, but to the vast number of smaller concerns who have not yet shipped to Latin America and who are desirous of securing information relative to the means of entering these markets, the facilities offered by our government will be of interest.

Bureau of Foreign and Domestic Commerce. You can obtain from this bureau, first: the names and addresses of foreign concerns that have expressed a desire to purchase American electrical goods. These are in the form of "Trade Opportunities," published in Commerce Reports, or sent confidentially to interested parties. Second: from the Commercial Intelligence Division you can secure classified lists of importers in each of the foreign countries in which you may be interested. Third: by subscribing to Commerce Reports ($4 per year), you secure a weekly governmental magazine with a wealth of up to date, authoritative information collected and written by the expert foreign staff of the Department of Commerce—the Commercial Attaches; Trade Commissioners and over four hundred Consular officers—besides many translations from foreign publications which might not otherwise come to your notice. Fourth: additional to these are the annual reports of the Consular officers, which can be consulted at the department or branch offices and excerpts from which are published from time to time. Fifth: the Electrical Equipment Commodity Division will give you expert information, prepared

by men who have been long engaged in the electrical business, and have been employed because of their knowledge of your business. Sixth: if you request registration on the "Exporters Index," you will be sent, confidentially, data and news regarding trade opportunities in your line. Your name will be supplied to foreign inquirers who wish to purchase electrical goods. Prompt notice of special monographs on your products will be sent you. In order to obtain registration for this service secure, either from the Washington office or one of the numerous branches, form No. 57. You should also obtain from the Bureau its pamphlet entitled "Practical Aids to American Exporters"—free on application—which gives full details of the Bureau's services.

with Latin American Markets

When you first visit a branch office, or write to the Bureau in Washington, be as explicit as possible and give them full information regarding your business. They will want to know, first: the type of merchandise which you sell—if a single article state exactly what it is, if a large line of products send catalog with your letter. Second: give the Bureau full details as to your prices, discounts, etc.—and, incidentally, in this regard, it is wiser in all foreign trade to give net prices of goods, or with a single discount, rather than quote in complicated form of say, "40, 20, 10, 10 & 5 per cent," as is sometimes done. Discounts of this kind are very confusing to foreigners who are liable to put all the figures together and in the case of the above quotation, arrive at an erroneous discount of 85 per cent. Third: what are your terms and are you prepared to offer the usual buying credits prevalent abroad where firms are of unquestioned standing? Fourth: are your quotations f.o.b. factory, or port of shipment, or f.o.b. steamer at port of shipment? Are carrying charges from f.o.b. point charged to the buyer or absorbed in your price? Fifth: how will your agent be compensated, by commission, special discount, or by what other means? Sixth: how are you prepared to assist your agent in advertising your goods in the foreign market? Seventh: are you already selling in the foreign market? If so, through whom and to what extent? If you have an agent already, why do you wish to make a change? Eighth: if your products are unknown and you wish to secure a sales agent, you should give the Bureau data regarding your business—capital, bankers, how long you have been exporting and other matters which would be of interest to a prospective representative.

Usually you will find it most expeditious to deal with your nearest branch office. It is usually less burdened with inquiries than the Washington Bureau and can give more time and consideration to your needs. If possible, call in person and explain your desires, rather than write. If the branch office hasn't the information you require, it will obtain it for you from Washington, or the foreign officers abroad. Generally speaking, it is unnecessary, undesirable and a waste of time to write to the Commercial Attache, "Trade Commissioner or Consul abroad, until you have secured all information obtainable from the local offices. Foreign officers are working at high pressure on reports called for by the Department, and may not have time to deal at length with your individual inquiry; besides, in most instances, all available information that they have been able to obtain has been sent to Washington and collated by the Department.

The preparation of a questionnaire is, in some instances, useful, as it gives the government offices an idea of the information you wish to acquire, but this should not be too general, nor too exhaustive. Should it seem advisable to secure a complete survey of the possible opportunities for trade in your product, and this has not already been covered, the Bureau will, if it deems the trade sufficiently general in importance, send out a questionnaire to its field force and consuls, and have a thorough investigation made, but as a general rule such inquiries are made on the request of the association concerned with your trade and, of course, when compiled, the data will be published for the general use of the trade. Government officers are not allowed to give information exclusively to any one individual concern.

When traveling abroad do not fail to get in touch with your foreign service officers, representatives of the Department of Commerce or the Consuls. They are anxious to assist you with information already secured, or place you in contact with the best sources. They welcome opportunities to serve you.

If you require information of a specific nature from some officer abroad it is perfectly in order to address him direct, and his reply will come to you through the State Department in Washington. It is not necessary to enclose return postage.

Don't write the Consul by his name, always address "The American Consul at ——." Letters addressed in person to a Consul are considered personal and are not opened in his absence. They may follow him to America if he is on leave, or be sent to some other country if he has been transferred, and delay will result.

Don't ask the Consul for information of a private or confidential nature regarding methods of payment, capital or credit of houses in his district. He is not allowed to give such information and will return any inquiries of this nature. He is also forbidden to show favoritism in his work and if you make specific inquiries, the reply to your letter will be sent through the Department of State, and if the special information for which you have asked is deemed by the Department to be of general interest, it will publish the same for the use of all interested.

Do not, under any circumstances, prepare a form letter and send it broadcast to consuls. When correspondence is necessary state your question simply and give as much information as possible about yourself and your reasons for the

inquiry. Remember that every mail brings the Consul many such letters, and in a busy capital it becomes almost impossible for him to give them individual attention, unless they can be briefly answered. It is for this reason that a general questionnaire is not to be recommended. If a questionnaire is broadcast the Consul in the large city will probably not have time to answer it in detail, and the officer in some small city, who has time for the purpose, may give detailed information regarding his particular area which, read in conjunction with the meager information from the busy center, may arouse the implication that the trade in the small place is more important than in the capital, and give a false idea of the trade in general.

Sometimes, when it seems advisable to secure specific information which might be a burden for him to obtain, the Consul, on request, will secure some local person to investigate the matter for you. You might send him a money order for $5 or $10 to be expended by him in securing the service of such a person, but probably a better way would be to write and ask him if he can have such an independent investigation made for you locally, and if he will suggest to you the name of someone who will undertake it, and what the cost of such an inquiry would be.

Any manufacturer who secures the close cooperation of the Department of Commerce officials, and uses the information to its fullest extent, will secure real dollars-and-cents results.

Do not, however, let this be your only source of information. Supplement it by data secured from other places as well, as suggested in my former article.

When you start to establish your business abroad and visit the foreign country, or when your salesman does so, the Consul can be of great value to you.

He will introduce you to bankers and prominent business men in your line of trade, or tell you how you can get in touch with them. He will advise you as to any legal formalities necessary in establishing your business abroad, in Latin America especially, the necessity for the use of "stamped paper" in certain instances. He will advise you how and when this "government stamped paper" should be employed. He will give you advice regarding the proper method of registering trademarks, and the importance thereof. He has available full information regarding taxation of traveling salesmen and their samples and catalogs. Import duties on these, and other local charges, such as stamp taxes, port duties and various other small matters of this nature.

It is not the Consul's duty to entertain you socially, as some Americans think. He is not provided with funds for this purpose and it should not be expected of him. If he does extend to you his hospitality, it is purely a personal favor and should be appreciated as such. Many traveling Americans feel that as the Consul is paid from government funds to which they contribute, that it is his duty to "wine and dine" them, and introduce them to his friends. Would you expect courtesies of this nature from the postmaster for instance, of some strange city that you might visit in the United States?

I recollect a telegram I received on one occasion from an electrical goods manufacturer when I was consul in China. It read, "Am arriving tonight, self, wife, secretary, two children and maid. Arrange accommodations." This, from an entire stranger in a city where there was no hotel. I "arranged accommodations" by taking care of "self, wife and secretary" for three days in my own home, parking the "children and maid" with friends, at the end of which time my guests departed without even leaving a small tip for my servants, or those of my friends, and without so much as sending a word of thanks afterward. In fact I have never heard from him since, although the man was a high executive of one of our large corporations and should have known better.

This is by no means an isolated case, as every Consul abroad can tell of similar impositions, and many others of a similar nature occurred to me during my twenty odd years of service abroad.

Your Consul will be delighted to give you every possible assistance in meeting people who will be of value to you, and if he likes you will probably extend to you his personal hospitality, but you should not expect this from him any more than you would expect if from a complete stranger at home.

Let me especially warn you against asking the Consul to assist you in securing funds, backing your check, or introducing you to his bankers for temporary accommodations. Consuls have been caught so often by requests for monetary accommodations that they naturally look with suspicion on anyone who is so careless as to become involved in financial difficulties while traveling abroad. This is a type of service your Consul cannot be expected to give.

American Investments in Latin America Increased 349% in 15 Years

ACCORDING to a study made recently for the World Peace Foundation by Dr. Max Winkler, investments of American capital in Latin America increased from $1,242,000,000 prior to the war to $5,587,494,000 at the beginning of last year, a gain of nearly $4,500,000,000, or 349 per cent in the 15-year period. Dr. Winkler states that Latin Americans are no longer suspicious of American investors except on rare occasions. It is interesting to note that during the same 15-year period mentioned British investments in Latin America increased only 18 per cent. Most of the American pre-war investment in Latin America was outside of South America, most of it being in Mexico and Cuba. American investments outside of South America has risen from $1,069,000,000 in 1913 to $3,293,282,000 last year. During the same period British investments increased from $1,148,407,000 to only $1,404,260,000. Speaking of the economic evolution of Latin America as a whole, beginning with the early development stage, Dr. Winkler says.

"The great development after 1880 was exclusively under European influence, and the participation of the United States was still insignificant. In the course of the third period, that is, during and after the World War, the financial relations of Latin America changed entirely and the United States, no longer a money-borrowing, pioneer country, but one with surplus wealth and money to lend, became the leading factor in the economic life of our southern neighbors. Everywhere," continued Dr. Winkler, "industrial methods have been or are about to be introduced. Large amounts of capital have been invested to improve old railroads or build new ones. Modern agricultural machinery is used, sugar extractive industries throughout the southern continent have been equipped with the most modern machinery, and factories of all kinds are modernizing in every way."

FIFTHS of seconds. What do they amount to? They are so important to electrical manufacturers making those products shown in the above illustration that the stop watch has become their common tool

500 Per Hour

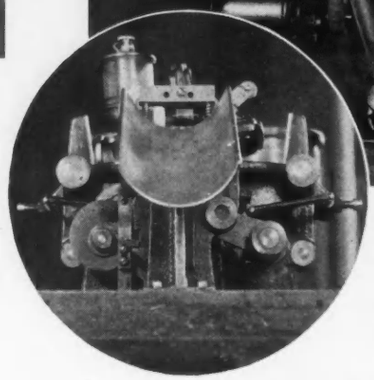
THAT is the production rate of one operator cutting short pieces of glass tubing by hand with a file. Every cut costs more than seven seconds

3500 Per Hour

BY this machine, designed and built by the Eisler Electric Corp., Newark, N. J.

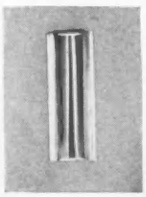
125 Grids Per Hour

HERE is a hand operated machine for making grids for vacuum tubes in common use in the smaller tube plants. A good operator can make 125 grids per hour with this machine. There are two operations in making the grid, winding and welding. A screw guide assures proper spacing of the wires. Each loop of wire is welded to the grid supports. The welding roller is operated by the left hand as shown

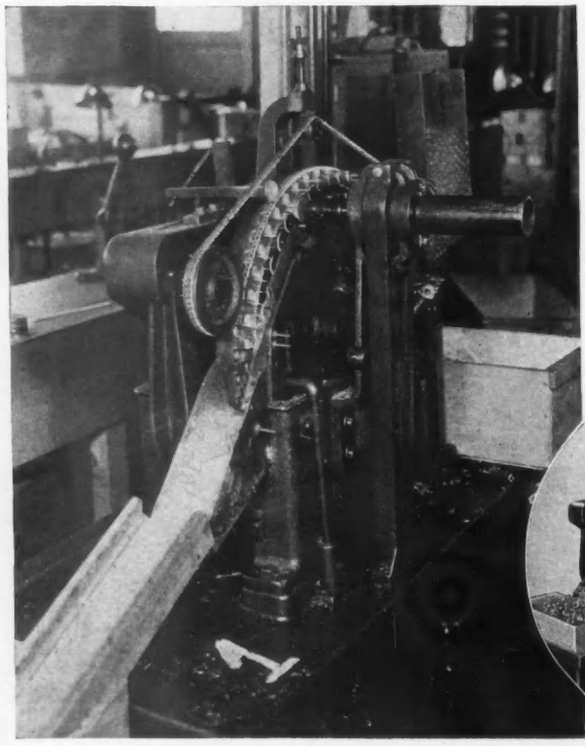


600 Grids Per Hour

THIS is a new automatic grid making machine manufactured by the Eisler Electric Corp., Newark, N. J., specialists in tube making machinery. One operator can take care of six of these machines



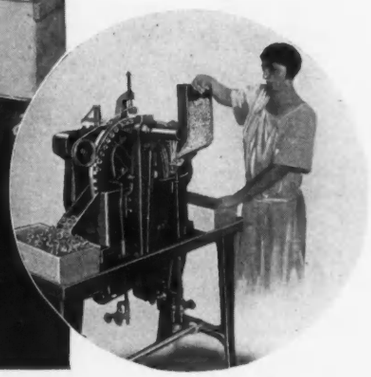
BEFORE entering flare machine the glass tube looks like this



AFTER running through the flare machine the tube looks like this

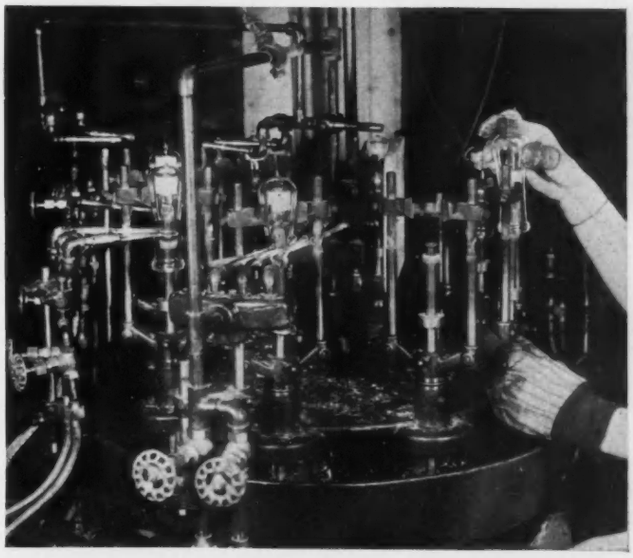
1000 Per Hour

THIS type of machine is recommended for large quantity production. Smaller machines are available for making 150, 350, 600, and 900 flares per hour. One operator can operate several of the machines shown here



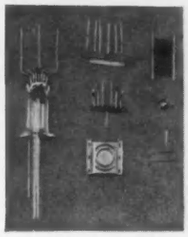
BEFORE passing around the sealing-in machine

THIS time saving machine used for sealing in the stems of vacuum tubes to the bulbs consists of a number of revolving spindles built around a circle. The tubes advance from one gas flame to another



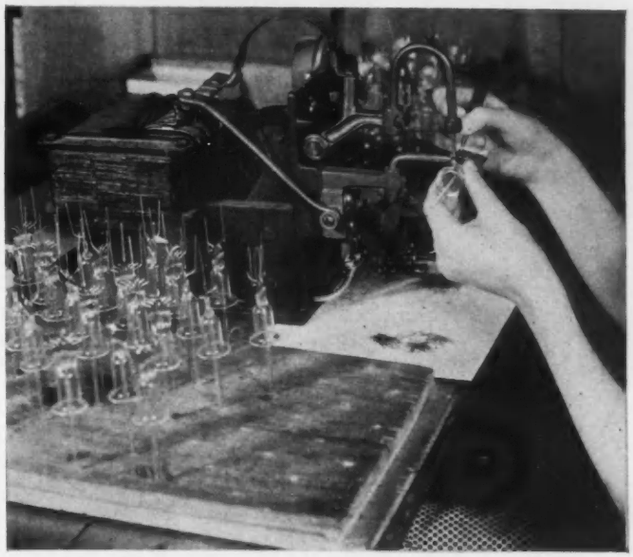
AFTER passing through the sealing-in machine

WHEN this machine is used the neck is pulled down and the stem straightened by hand. Machines are available which do this automatically. Machines can be provided for either tip or tipless bulbs



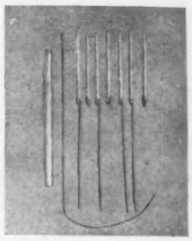
BEFORE assembling elements of vacuum tube

SPOT welders of this type are used for such fine work as assembling elements of vacuum tubes and light bulbs. Many types of jaws are provided for various types of welding work. The jaws are brought together by pressing a foot pedal



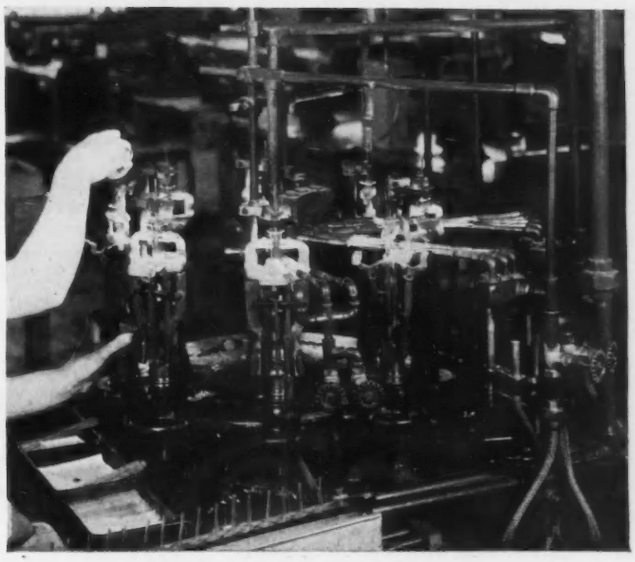
AFTER assembly of vacuum tube elements

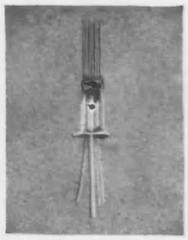
WIRE or sheet stock as fine as .0005 in. to 1/16 in. may be welded together by the use of this machine. This illustration shows the jaws of the welder pressed nearly together with the pieces to be welded between. The weld is made when the foot is pressed a little farther



BEFORE passing through the stem machine

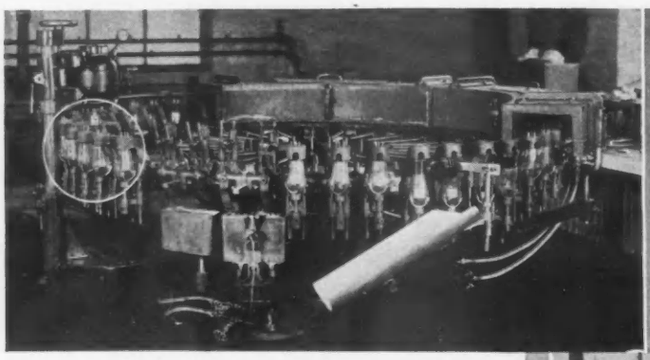
IN design this machine is similar to that of the sealing-in machine shown at the top of the page. White lines indicate the location of the gas flames





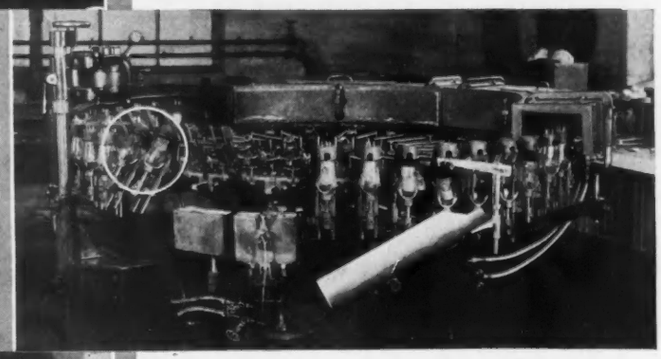
AFTER passing through the stem machine

EITHER tip or tipless automatic indexing stem machines are available. This machine has eight heads and will turn out 250 seven wire stems per hour



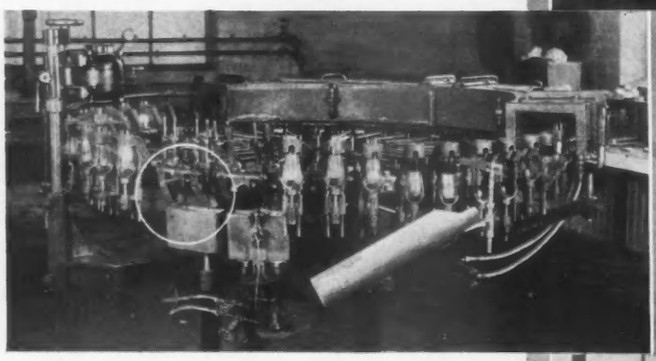
Wires Being Sawed

THIS is the first picture taken of a new machine designed to attach bases and prongs to vacuum tubes automatically. This picture was taken at the Eisler Electric Corp. before the machine was put into service. This view shows the process of sawing off the lead wires even with the ends of the prongs



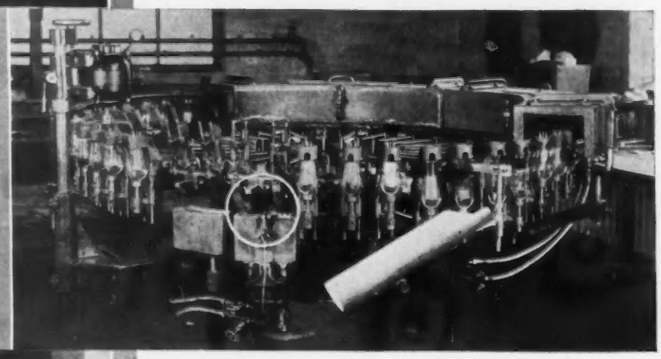
Turning Over

HAVING passed under the saw, the tubes are just starting to turn preparatory to the fluxing operation. By using this machine one operator can base, trim and solder the wires of 750 tubes per hour. By old methods three operators are required to complete the same processes on 500 tubes per hour



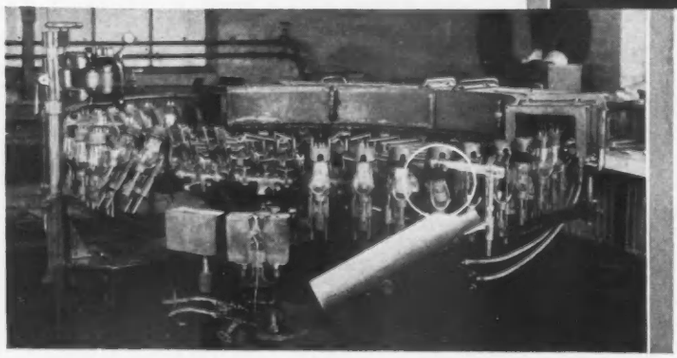
Wires Being Fluxed

THIS shows the prongs of two tubes dipping into the fluxing bath, the tubes having completed the turn the start of which is shown in the illustration above. The fluxing pot may be adjusted up or down to accommodate tubes of different sizes and kinds



Wires Being Soldered

THE prongs of the tubes have just dropped into their lowest position and the wires are in the process of being soldered to the prongs. Although this machine shows the solder pot being heated by gas, it is stated that in many cases the solder will be heated electrically



Tripping Tube Out of Machine

AT the end of its run, the tube is automatically tripped out of the machine, where it falls into an aluminum trough. The method of catching the tube at the end of the trough is not shown here, the machine having been set for experimentation only when this picture was taken

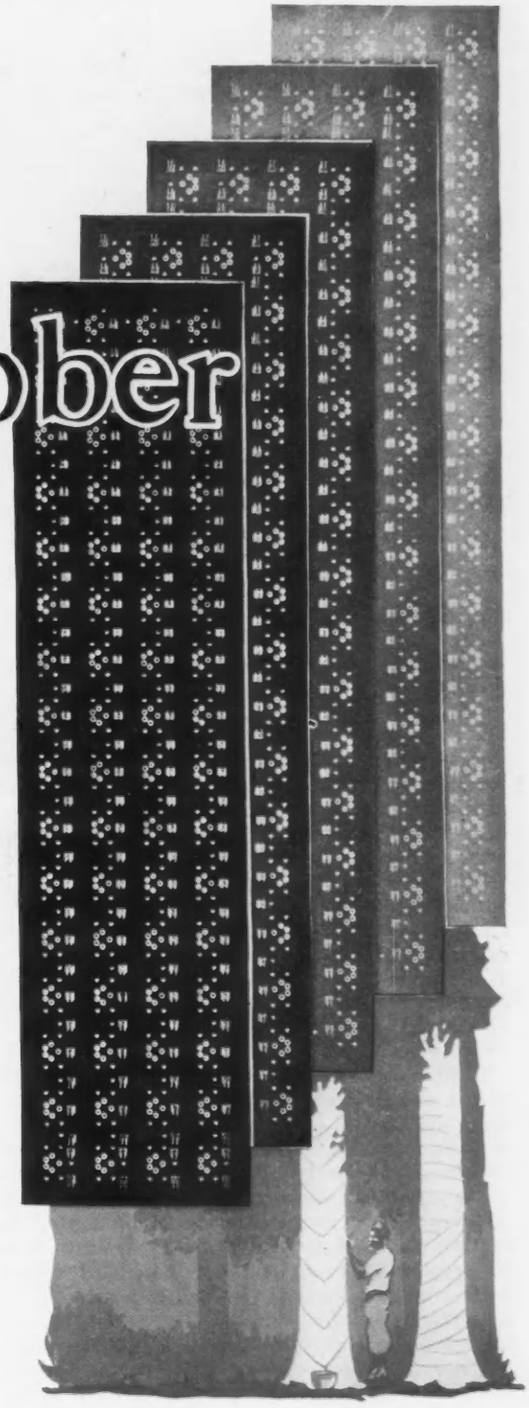
Electrical Materials

Widely Used—

Hard Rubber

By William Crawford Hirsch

ALTHOUGH rubber will not stand up under high temperatures, it possesses the property of healing up after an arc has broken down its surface without leaving a path of carbon. Hard rubber has had for many years and continues to have a well entrenched place in storage battery jars,* covers, vents, and linings. This is accounted for by its dielectric strength paired with its resistance to the corrosive tendency of sulphuric acid



THIS illustration shows a radio tube test panel manufactured by the Insuline Corporation of America. All of the parts are mounted on a hard rubber panel about four feet high

HARD rubber possesses certain properties which, from the very beginnings of the electrical industry, have given it high place as an insulator at ordinary temperatures. It is homeogeneous, tough, elastic, flexible and unsurpassed in its resistance to acids. As holds true of all engineering materials, the factor of limitation modifies its sphere of usefulness. In the case of hard rubber, what the material will not do was for many years given prominence out of all proportion to what it will do, so that a sort of inferiority complex developed in the ranks of fabricators. One competitive material after another sprang up. Some of these possessed the advantage of being able to withstand much higher temperatures. Others lent themselves to a much wider variety of finishes. The principal inroads, however, resulted from materials that could be marketed at relatively low prices at a time when the crude rubber market was soaring skyward. It is nothing short of remarkable and perhaps the highest tribute that could be paid to the inherent merits of hard rubber as an insulating material that, despite this competitive on-rush and amid a paucity of effort to overcome by research and promotion the intensive work of the laboratories of competitive plastics manufacturers, electrical consumption of hard rubber fared as well as it did.

It is only within recent years that American capital has become interested in rubber-growing. After all, these investments are a mere drop in the bucket, the production of crude rubber being preponderatingly a British and Dutch affair. Our interest is chiefly that of the heaviest consumers of a commodity which so far is not grown under our own flag. Our principal concern in the period from 1913 to the present, in which our crude rubber consumption increased from 110,000 to 480,000 long tons—about 335 per cent—has been in a market free from artificial restraint, such as that which obtained while the Stevenson Act restrictions against exports from the Far East were in force. The fact that we are consumers and that foreign nations are the producers of rubber may perhaps explain why American fabricators have in the past given much more attention to the gathering of statistics that would protect their interests in the world's crude rubber markets than to

*See article beginning on page 37.

the sales promotion of rubber products. A recent occurrence is illustrative of conditious. A prominent metal producing corporation, which requires much water-power in its metallurgical processes, wanted to make exhaustive tests in its research laboratories of materials that would produce the most economical and durable dam. The investigators were not satisfied with the engineering information available, and decided to build a model dam of rubber, to determine the behavior of material under hydrostatic conditions. So as to facilitate the comparative calculations, the rubber manufacturers were asked to furnish data covering the moduli of compression, elasticity, resistance, rupture, etc., of different rubber compounds. This the rubber manufacturers were unable to do. This metallurgical company is now testing with delicate instruments the various physical properties of different rubber compounds to make possible selection of the one which in the model will simulate concrete in the actuality. This incident is mentioned merely by way of showing that the task of studying the properties of rubber and through a knowledge of these to utilize it to best advantage has in the main devolved upon the individual consumer.

Magnitude of Market Lost Sight Of

ONE striking feature of the rubber fabricating industry's history is that there is at all times one outstanding use which so completely eclipses all others that the magnitude and development of the market as a whole are lost sight of. Three-quarters of our crude rubber imports find their way into automobile tires and tire sundries. To a smaller extent this centering of the industry's interest in some one application of its products rather than in the field as a whole holds true of hard rubber. During the heyday of radio receiving sets, hard rubber sheet in large quantities went into panels. Condensers also absorbed a good deal. Dials, knobs, sockets, rotors, loud speakers and head-sets furnished quantity outlets for hard rubber which possesses as special virtues low phase angle difference, low dielectric constant, high resistivity and low absorption of moisture. While radio consumption of hard rubber parts was to the front, little was done to promote its use in a large number of electrical applications in which it has become a sort of an old standby.

Hard rubber has had for many years and continues to have a well entrenched place in storage battery jars, covers, vents, linings, etc. Its dielectric strength paired with its resistance to the corrosive tendency of surphuric acid serve as explanation for this. Hard rubber insulators continue to serve in some high tension power lines as distributor rotors and blocks, antennas, collector spools, etc. While rubber will not stand up under high temperatures, it possesses the property of healing up after an arc has broken down its surface without leaving a path of carbon. It is, however, in a myriad of special electrical uses, ranging in variety from the wheels of vacuum cleaners to parts of X-ray and electrotherapeutic machines, that the aggregate consumption of hard rubber is especially promising. A good deal of the manufacturing equipment in the electrical industry consists of hard rubber. The preparatory processes before metal parts are finished, such as cleaning and pickling, are carried out in hard rubber tanks which defy the acid solutions used. Electroplaters have found hard rubber protection for their racks and hooks to cut down considerably the cost of reclaiming the metal residue that is not deposited on the ware. And so one might go on and compile a long list of electrical uses of hard rubber from the commonplace flush switch and receptacle plate to its employment as a support for the letters in electrically operated signs. Just now the motor steering wheel and pipe for the chemical and electrochemical industries have the chief attention of many hard rubber manufacturers as potential quantity outlets, but the widely diversified usefulness of hard rubber, especially in electrical applications, is coming in for more and more exploitation by leading fabricators. One of the old-established hard rubber specialists recently inaugurated a national advertising campaign, using standard electrical products as illustrative material and seeking to drive home to the public as well as to industrial users not any particular application of hard rubber, but the wide scope of its use.

Rubber Production Has Grown Enormously

WORLD rubber production has grown from 60,000 tons a quarter of a century ago to more than 650,000 tons, and prices for the staple have receded sharply. Grades of crude rubber that sold in 1910 for $1 a pound are now available at 16 cents. Neither the War nor artificial restriction of output and shipments from producing points have stemmed the downward trend of crude rubber prices. The economic position of hard rubber, therefore, has undergone a change since the high price of crude gave an advantage to competitive materials. It is obvious that the greatest need of the rubber industry, from growers to fabricators, is extension of consuming outlets. Its real safety lies in buttressing its position by adding to automotive consumption, predominant as it is, as wide a distribution as possible in other fields and among these none is more promising than the electrical where hard rubber has for years had a solid footing.

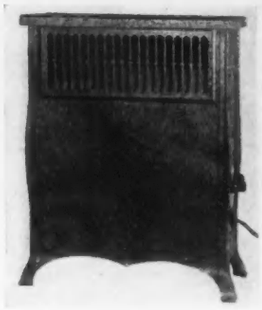
Continuous and consistent progress rather than startling developments have marked the advancement of rubber manufacture since Charles Goodyear, nearly a hundred years ago, stumbled accidentally upon the secret of what has since become known as vulcanizing when he happened to spill some rubber and sulphur on a hot kitchen stove. Vulcanization is the process by which crude rubber through chemical combination with sulphur in the presence of heat is transformed into the article of commercial or industrial usefulness. It is noteworthy that the rubber industry was one of the first to experiment with the use of ultra-violet rays as a manufacturing auxiliary. The use of electricity in the vulcanizing process was also tried out at a time when many other basic industries showed but little interest in the subject. That these modern tools have not been generally adopted by the industry was due to reasons of practicability and economy.

Both Hard and Soft Rubber Vulcanized

PERHAPS because hard rubber is known by the name of vulcanite, some people are under the impression vulcanization is a special feature of hard rubber. This is not so. Soft rubber is also vulcanized. The hardness of hard rubber results from a combination of the special mix of rubber and sulphur and the vulcanizing temperatures employed. In the early days of the hard rubber industry 2 pounds of India rubber to 1 pound of sulphur was the standard. Better knowledge of the chemical and physical properties of both rubber and sulphur as well as the discovery of other suitable ingredients broadened the scope of hard rubber compounds. The modern compounder works with a view to producing the properties demanded of hard rubber in a given use in the most economical way. Larger proportions of sulphur are used in hard rubber mixtures than in soft, the sulphur content ranging from 5 per cent in fine tubing to almost 50 per cent in certain sheets. Hard rubber molded insulation contains on an average about 30 per cent sulphur, while in battery jars about 14 per cent sulphur is used. The vulcanizing temperature called for by hard rubber is approximately 300 deg. fahr.

Virtually all the ordinary grades of crude rubber, especially, however, Para, are used in the compounding of hard rubber mixtures. In addition to the virgin material, hard rubber dust is used in varying proportions in the mixtures. Besides sulphur a number of other mineral products, such as zinc oxide, litharge, china clay, lamp black, asbestine and lime enter into the different formulas.

COMPARE these two illustrations. One is a dead "thing," and the other breathes with the strength of life. Use an illustration like the one at the right in your advertising, and it will almost talk to the reader



Dramatize Your Product

CREDIT is due the Airway Electric Appliance Corporation for the excellent illustrations reproduced on this page. The product is an electric heater, and the illustration below has in itself the quality of warmth

AN electrical product is not just an inanimate thing; it is a potential servant. It is the expression of someone's idea of a human need. In presenting the product to the logical consumer this basic idea behind the product is the important consideration. The idea is human. Thus the effective presentation must also be human

By ROGER L. KNIGHT

Associate Editor, ELECTRICAL MANUFACTURING

SAID Confucius, "One picture is worth ten thousand words."

How true, and how well the modern expert advertiser has learned this lesson. Study almost any outstanding piece of advertising and it is found that its excellence lies in the skill displayed in blending illustrations and copy. It does not benoove us to enter into the perpetual debate as to the comparative value of illustrations and copy. Our plea is that if illustrations are to be used, they should be dramatized. On this and the following two pages are examples of what we mean by dramatized illustrations of electrical products.

A good illustration tells a story without any copy. The trouble is that it may tell any one of several stories. It is thus necessary to make the story definite with copy. The better the illustration, the less copy is necessary to complete the interpretation the picture is supposed to make. It cannot be assumed, however, that the interpretation can be made accurate without the illustration. A well-made illustration of a fluffy white cake being withdrawn from the hot oven of an electric range pro-

"JUST another radio set" is the only message this illustration has to offer, yet an astonishing proportion of current direct mail advertising uses illustrations of this character. The product is there, but not the spirit of the service it was built to give

duces a sensation that cannot be duplicated by words. Such an illustration is effective because it talks to the reader in his own language.

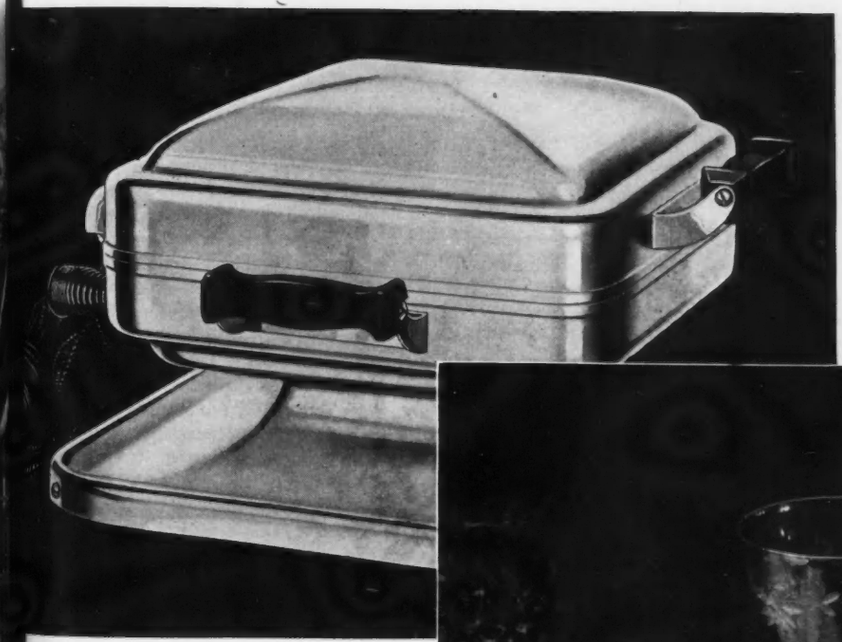
The two large illustrations on this page are excellent examples of interpreting an idea with illustrations. These sets were made to show how the small radio cabinet harmonizes with different types of home settings. There is the idea, stated in eighteen words. It might be stated in fewer words, or it might be elaborated upon with additional words, but however many words are used, the life blood of the idea lies in the illustrations. The words merely guide the mind into the right mood for gaining the full benefit of the pictures.

IF you are reading these words the chances are ten to one that it is because the illustrations on this page "stopped you." What a difference there is between the picture of a radio set and the picture of a radio set plus atmosphere. Such illustrations as these require settings. These settings were built each in a space six feet square by the advertising agency Batten, Barton, Durstine and Osborne. The settings are simple, and were built at very reasonable cost

The function of an illustration is not merely to show the physical appearance of a product. The true function is to interpret the service which the product is designed to give. There is something human about every manufactured product, for every product is a creation of a group of human beings. There is no limit to the ingenuity that can be applied to dramatizing your product.

IS there anything here that suggests the pleasure of a cup of coffee? Such an illustration doesn't even give a hint as to the size of the product, and dimensions make dull copy

A LITTLE atmosphere is better than none. Cream in the pitcher, a sugar bowl, some silverware, and a plate of wafers would greatly improve this illustration. But it has the human touch. It says "coffee" and not just "percolator"



THERE is nothing like natural settings for natural photographs. If the cost of building settings in a studio is prohibitive, almost as good results can be obtained right where the product is used. The above setting consists of a bridge table with a table cloth on it placed against a plaster wall

IT is evident that any piece of direct mail making use of the above illustration would be much weaker than if such an illustration as that at the right were used. When we think of good waffles we think of something hot and crisp. The iron shown above is obviously not hooked up. The illustration at the right is good, but could be made a lot more human by the addition of hands, batter, syrup and butter

Even Material Handling *Yields to* Wage Incentive Plans

By C. A. FIKE

Superintendent of Plant Transportation,
Westinghouse Electric & Manufacturing Company

MR. FIKE describes in this article, which was delivered as a paper before the American Society of Mechanical Engineers, the methods used in installing incentive wage payment plans on two different phases of material handling activities at the Pittsburgh plant of the Westinghouse Company. The first application was to industrial electric trucking, the other to a material-supply group in the motor manufacturing department.

MATERIAL handling presents a fertile field for wage incentives. No appeal is stronger than that to the pocketbook, especially when made to workmen on this type of work where there may be small opportunity to create interest or enthusiasm due to its monotonous nature. Such work usually appeals to a certain type of workman, but unfortunately this type is not often a production man, and unless interest is aroused in some manner, the entire production-line efficiency is affected. However, if an incentive is placed on the work, and the worker realizes that output affects the sum of money he receives in his pay envelope, the results are often astonishing; output per man increases, labor turnover is lessened, and it is no longer difficult to keep men on the monotonous jobs. In jobs where heavy physical effort with slight mental energy is the requirement, the results are the same.

The primary cause for an incentive wage-system installation is to increase manufacturing efficiency by supplying a reason to the worker for taking full advantage of all facilities provided, as well as a stimulant for increased personal efficiency, both through mental and physical effort. The worker provided with such an incentive will make effort to avoid delays, rather than invite them as giving an opportunity for a rest, and where some delays are unavoidable, will exercise his ingenuity to minimize them. The increase in earnings brought about in such manner attracts and holds a better type of worker.

In placing an incentive on material-handling work, considerable preliminary work must be done, especially if it is on work which is entirely new to such procedure. If it is the latter type, effort should be made to pick out that part which will most quickly and clearly show results. In other words, establish incentives on the easier jobs first, and those that are harder will not be so difficult when installation is finally started on them. Before any time studies are taken, the workers should understand what is to be done, and as far as possible how it is to be done. As a rule, if the "stage is set," in this way the worker becomes an active and willing participant in the installation, and the work is facilitated to that extent.

Securing a Measurement

In setting an incentive on material-handling work, probably the hardest thing to determine is the unit of measurement. In ordinary production work, the piece or part is usually the yardstick; such cannot always be the case on material handling. Take for example, the loading of miscellaneous material on railway cars for shipment. The pieces are unlike in size and weight, and to place separate values on each one would be impractical as the cost of clerical work would outweigh the labor savings. However, in such a case, the car weight unit can be used; cars are weighed before shipment, so the unit is available without any extra work or expense. From this it will be seen that each material-handling job must be considered as a separate problem, each with its own solution, but all based on a common principle. The unit of measurement must be understood easily, and require no great amount of clerical work or supervision in its application. Careful checking and a thorough understanding of the job under consideration will ordinarily show some logical unit which will meet these requirements.

Method of Payment

Material-handling work is usually performed by several workmen, each dependent upon the other in order to secure cooperation, coordination, and efficiency. For this reason such work can be placed advantageously on a group incentive. There are variations of this where the work may be included with a production group of men, or where the time value for material handling may be included with the production operation. If the latter case, and the production part of the work is also on a group incentive, a material handler may be included as one of that group. For example, a group of workers are dependent upon a trucker for material supply; by placing the trucker within the group, he realizes that his earnings are dependent upon keeping the group fully supplied with material at all times, and at the same time the group will aid the trucker to do his work properly, knowing that their earnings can be made higher or lower in proportion to the trucker's efforts.

Here is how it works out: A number of workers are placed in a group; earnings are pooled and distributed on a pay-period basis of the total hours worked by each individual in the group, times his individual rate. A simple example will illustrate this. Four men have made a total of 400 hours in a group during a pay period; A worked 100 hours, B worked 80 hours, C worked 50 hours, and D worked 170 hours. Earnings would then be distributed as follows:

$$A = \frac{100 \times 400 \times \text{Rate}}{(100 + 80 + 50 + 170)}$$

$$B = \frac{80 \times 400 \times \text{Rate}}{(100 + 80 + 50 + 170)}, \text{ etc.}$$

Provision is made for various grades of work within the group by a difference in the individual rates of the workmen, supervision within the group is taken care of by extra compensation, but percentage of gain or bonus earnings are

(*Concluded on page 74*)

Proving It Can Be Done

An editorial by

STANLEY A. DENNIS

EVERY sales-building activity launched within the electrical industry is slowed down by the indifference and cynicism of electrical people who ought to be its friends but who are not. If there is any exception to this blunt and ugly statement, let somebody stand up and say so. Any man in his right mind knows that no matter how splendid any human achievement may be, it carries within it certain imperfections that seem inseparable from human conduct. Probably it will always be so. That fact, however, does not justify anyone in starting obstructive tactics even before an activity has had a chance to show what it can accomplish. Yet any man acquainted with cooperative work in industry and commerce knows that numerous hard-boiled old-timers are usually strung along the sidelines waiting for a chance to exercise their little hammers. The wonder is that something worth while *is* accomplished now and then.

Witness this adventure in sales-building by the Electrical Association of New York. This new organization, a consolidation of the former New York Electrical Board of Trade and the New York Electrical League, recently launched an activity called the "Electrical Modernization of Industries Plan." Few local activities within recent years have carried the promise of achievement that accompanies this activity. Enthusiasm, sincerity, ability, and a spirit of fair play have characterized the leaders in this movement. Specific accomplishment has marked its progress during the several months it has been under way.

ONE accomplishment alone deserves the editorial spotlight. In promoting the idea of industrial modernization it was found desirable to lay before the electrical contractors certain engineering data on various electrical products salable to industrial plants. Certainly here was a chance for the manufacturers of these products to get into a scramble to place "my data on my product" before the contractors. It was an opportunity to demonstrate the finest kind of cooperative spirit or to wreck the entire activity.

What actually has happened is this: Committees were appointed on thirteen different classes of products. Local representatives of concerns manufacturing these products were appointed on these committees. They met, discussed the kind of engineering information to be laid before the contractors, reached decisions on points thought to be in hopeless conflict, drew up this information in question-and-answer form, prepared neutral illustrations where necessary, edited the manuscript and presented the results of their work to the association for publication.

The joint result of this unusual and almost remarkable piece of work is a handbook on "The Electrical Modernization of Industries." Probably the industry never before saw the like of it. Similar activities have characterized standardization work in various national associations, but not in an intensive and highly competitive local sales activity such as this one. The handbook, as now published, contains invaluable reference data for the contractor when interviewing a manufacturer on the question of the electrical modernization of his plant. Completed sections of the book cover the following subjects: illumination, industrial control, industrial heating, motors, signaling, switchboards, panelboards and ventilation. Work is still under way on: material handling, signs, refrigeration, tools, wiring, clocks and other products.

THE preparation and publication of this handbook is in itself a unique achievement of cooperative effort and one which deserves the applause of the industry, regardless of the final results of the movement as a whole. As an educational and sales effort initiated and accomplished locally, the handbook is indicative to other local groups of the kind of coordinated selling effort that is possible when there is a determined effort on the part of all concerned to get together in a very definite and practical way. Equipped with the information contained in this book, the contractor or salesman who never before sold an industrial modernization job now finds himself in a position to make such a sale. Furthermore, worthwhile orders are today being placed by industrial concerns within the New York territory with contractors who have used this handbook in their selling.

This achievement goes a long way toward proving that it can be done. And yet, only the leaders in this activity know the obstructive force of indifference and criticism and "I-told-you-so-ism" that has been met all along the line. Apparently all selling effort cooperatively organized within an industry must face its detractors. Perhaps they do serve some useful purpose. In the long run, the forces of progress usually win out. How soon success is won may depend not only on the strength of the forces behind an activity but also on the resistance and inertia of those who should support a movement but fail to do so. Let every electrical man think twice, or even three times, before he sits down in the way of progress. Steam rollers are not respecters of persons.

People Have Been

By J. K. Olsen

Chief Draftsman,
Stewart-Warner Corp., Chicago

READERS will remember Mr. Olsen by two series of articles which he prepared for Electrical Manufacturing last year on the methods of laying out, estimating, and planning of raw material. For the past eleven years Mr. Olsen has been chief draftsman of the Stewart-Warner Corporation. Before this he obtained a broad experience in the mechanical field with the Crane Company and with the Western Electric Company

WHEN a single unit is to be made or reproduced a great many times as is generally done in production, it is vitally important to have and use the commercial basic weight constants of the required material.

Without accurate weight figures it is impossible to estimate proper cost of the required material or cost of the finished product.

As the raw material cost in the great majority of cases is the largest item governing the final price of a product, it is also in many instances the break or make of an order, therefore correct constants and carefully figured raw material weights are correspondingly important.

Knowledge of the proper weight constants is also essential in figuring the quantity of raw material to be purchased for making a required number of parts.

There is a great difference between having an approximate estimate which in most cases is made so far on the safe side as to leave a large amount of left-over stock, and a proper estimate that will furnish the required material necessary without waste and still sufficient for the required parts. The latter estimate is also a good check on the production departments and would tend to maintain efficiency in the shops.

In the accompanying table there is listed in Column 1 a comprehensive compilation of material names of the most used metals, metal alloys and other common materials used in every-day manufacturing.

These materials are listed in alphabetical order subdivided into the common kinds such as rod, sheet, wire, etc.

Column 2 is included for reference purposes. This column shows the standard or commercial sizes and gages in which each material can generally be purchased.

Most suppliers can and are able to furnish their materials in any reasonable size or shape when quantity and conditions warrant special dimensions but it is of advantage to both customer and supplier that the common standard or commercial sizes and gages are used and preferred.

There is another reason not so often mentioned but practically very important, that is, the common error in specifying the sizes or gages with the wrong dimension due to ignorance or lack of correct data.

Column 3 in the table gives the exact weight of each material in pounds per cubic inch.

This weight has been compiled from a large number of

Column 1	Column 2	Column 3	Column 4
MATERIAL	Commercial and Preferred Gage or Size	Exact Weight in Lbs. Per Cubic Inch	Constant for Weight in Lbs. Per 1000 Pieces Plus 5% Scrap
ALUMINUM			
Angle	Standard		
Rod	Diam. in Fractions of an inch		
Strip or Bar	Thickness in fractions of an inch or American (B. & S.) wire gage width in fractions of an inch	.09650	101.2
Pipe	Standard wrought iron pipe size	.09682	101.7
Sheet	Thickness in Fractions of an inch or American (B. & S.) wire gage	.09670	101.5
Seamless Tubing	Outside diam. in fractions of an inch. Wall thickness in Birmingham or Stubs wire gage	.10145	106.5
Wire	Diameter in American (B. & S.) wire gage	.09630	101.1
BABBIT (White Metal)			
Bearing, Liner	Commercial bar	.3600	378.0
MOLDED INSULATION			
Rod	Diameter in fractions of an inch		
Sheet	Thickness in fractions of an inch		
Tubing	Inside and Outside diam. in fractions of an inch	.0488	51.2

After This Information

FLYING full of facts are the tables* published with this article. These tables of weight constants and gage designations have been compiled to meet the need of electrical men who figure quantities and costs of raw materials which are incorporated into the design of electrical products.

These tables give the constants for the most used metals, metal alloys and other common materials used in every-day electrical manufacturing. Half of the tables are published this month and the other half will be published in an early issue.

In Column 1 are given the names of raw materials. Column 2 is included for reference purposes, and shows the standard or commercial sizes in which each material can be purchased. Column 3 gives the weight in pounds per cu. in., and Column 4 gives weight constants

authoritative sources and obtained from raw material manufacturers, and some of them by actual weighing of stock.

These weights have been successfully tried out by several years practice and represent weights of commercial material and not theoretical material in its purest form.

There are also many problems in engineering which require accurate weight figures. The third column is also made to include and take care of this.

Column 4 in the table is for production figuring. This is the main column and gives the weight constant for 1000 pieces in pounds. This constant includes a 5 per cent scrap allowance.

This column 4 is made to take care of the common practice of figuring weights with a 5 per cent allowance for waste for a large number of parts as in a mass production there always will be a certain rejection of parts or material which is classed as scrap.

The amount of this scrap is very variable and depends to a great extent on the design of the part and the method of manufacture.

Experience has shown however, that for parts made in the ordinary up-to-date manufacturing plants and made by such common methods as punch-press, screw-machine or other methods working within fairly close limits, the amount of scrap can generally be successfully held at 5 per cent.

With the aid of the weight constant table, figuring the weight of a part or number of parts, or raw material for a production run is very simple, as the weight of any geometrical object is the straight product of its volume, times its constant. This constant is given for each material and only depends on what the object is made from and the weight is given in pounds per cubic inch.

Example 1. For the material in question, the exact weight of one part is the volume of the part in cu. inches multiplied by the weight constant found in column 3.

Example 2. If the necessary raw material for 1000 parts is to be figured, the weight of 1000 parts plus 5 per cent scrap is the direct result of the volume of the part in cubic inches multiplied by the weight constant found in column 4.

* *Extra copies are available. Write the Editor.*

Column 1	Column 2	Column 3	Column 4
MATERIAL	Commercial and Preferred Gage or Size	Exact Weight in Lbs. Per Cubic Inch	Constant for Weight in Lbs. Per 1000 Pieces Plus 5% Scrap
BRASS			
Angle Rod	Standard Diam. in fractions of an inch	.3075	322.9
Pipe Seamless Tubing	Standard wrought iron pipe sizes Outside diam. in fractions of an inch. Wall thickness up to and including 5/16" outside diameter in American (B. & S.) wire gage. Above 5/16" outside diameter in Birmingham or Stubs wire gage	.3069	322.2
Sheet	Thickness in fractions of an inch, or in American (B. & S.) wire gage	.3067	322.0
Strip and Bar	Thickness in fractions of an inch or in American (B. & S.) wire gage width in fractions of an inch	.3074	322.8
Brazed Tubing	Outside diam. in fractions of an inch. Wall thickness in American (B. & S.) wire gage	.3113	326.9
Wire	Diam. in American (B. & S.) wire gage	.3057	321.0
BRONZE, BEARING			
Cored and Solid Bars	Diam. in fractions of an inch	.3415	358.6

Column 1	Column 2	Column 3	Column 4
MATERIAL	Commercial and Preferred Gage or Size	Exact Weight in Lbs. Per Cubic Inch	Constant for Weight in Lbs Per 1000 Pieces Plus 5% Scrap
BRONZE, COMMERCIAL			
Brazed Tubing	Outside diam. in fractions of an inch. Wall thickness in American (B. & S.) wire gage	.3154	331.2
BRONZE, PHOSPHOR			
Rod	Diam. in fractions of an inch	.3195	335.5
Strip	Thickness in fractions of an inch or in American (B. & S.) wire gage width in fractions of an inch	.3160	331.8
Wire	Diameter in American (B. & S.) wire gage	.3210	337.1
Wire cloth	Wire in old English gage		
BRONZE, TOBIN			
Rod	Diameter in fractions of an inch	.3036	318.8
Sheet	Thickness in fractions of an inch or American (B. & S.) wire gage width in fractions of an inch		
CELLULOID			
Rod	Diameter in fractions of an inch	.0558	58.6
Sheet	Thickness in fractions of an inch or sheet celluloid gage	.0503	52.8
COPPER			
Angles	Standard		
Rod	Diam. in fractions of an inch		
Sheet Rolled to Weight	Thickness in pounds or ounces per sq. ft.		
Strip or Bar	Thickness in fractions of an inch or in American (B. & S.) wire gage width in fractions of an inch	.3215	337.6
Buss Bar	Thickness and width in fractions of an inch		
Pipe	Standard wrought iron pipe sizes		
Seamless Tubing	Outside diam. in fractions of an inch. Wall thickness in Birmingham or Stubs wire gage	.3227	338.8
Hot Rolled Sheet	Thickness in fractions of an inch or in American (B. & S.) wire gage	.3230	339.2
Wire	Diam. in American (B. & S.) wire gage	.3212	337.3
Wire cloth	Wire in old English gage		
DURALUMINUM			
Rod	Diam. in fractions of an inch		
Seamless Tubing	Outside diam. in fractions of an inch. Wall thickness in fractions of an inch		
Wire	Diam. in American (B. & S.) wire gage	.1010	106.1
Sheet	Thickness in fractions of an inch or American (B. & S.) wire gage	.1008	105.8
FIBER Vulcanized			
Rod	Diam. in fractions of an inch		
Sheet	Thickness in fractions of an inch or American (B. & S.) wire gage		
Tubing	Inside diam. in fractions of an inch. Wall thickness in fractions of an inch	.0505	53.0
FIBER Horn Fiber			
Sheet	Thickness in decimals of an inch	.0400	42.0
GLASS			
Cane, Rod	Diam. in "Cane Glass Gage"		
Tubing	Outside diam. and thickness of wall in "Glass Tubing Gage"	.1024	107.5
Common Sheet	Thickness in fractions of an inch	.0972	102.1
IRON			
Pipe wrought	Standard wrought iron pipe sizes		
Rod	Diam. in fractions of an inch		
Heavy Sheet and Plate	Thickness in fractions of an inch		
Plate	Thickness in U. S. standard plate gage		
Black Sheet	Thickness in U. S. plate standard gage	.2778	291.7
Wire	Diam. in Washburn & Moen wire gage	.2808	294.8

7 Motor Tests

WHAT routine tests should motors be given before they are ready for the market? These seven tests of the U. S. Electrical Mfg. Co. show what this company considers necessary in testing to keep its motors consistently to a uniformly high quality

1 TEMPERATURE RISE. Thermometers are applied to the hottest accessible parts of the motors. Motors are run at rated load until temperature is constant. Ambient temperature is measured at several points in the path of cooling air

2 RUNNING TESTS. Each motor is checked with a tachometer for speed. Stethoscopes are used to detect possible bearing fault and to observe any unusual rhythm tone or beat which might be caused by misalignment of bearings

3 SPEED TORQUE TESTS. These tests determine the ability of the motor to exert its torque at different speeds from zero to synchronous speed. All designs and ratings are given performance tests as well as a final mechanical check-up

4 NO-LOAD SATURATION TESTS are made to observe core losses, copper loss, friction and windage losses. The results are required to calculate the efficiency of the motor under the rules of the American Institute of Electrical Engineers

5 LOCKED SATURATION TESTS disclose the amperes flowing and watts consumed. the foot-pounds torque exerted by the rotor when locked on predetermined various test voltages. Ampere readings indicate the starting current taken when the motor is thrown on the line. This test also establishes the starting torque

RESEARCH and experimental work (above) is carried on separately from engineering and production divisions

EACH motor passes through a fixed routine of test for observation and recording (left). Test tags are used

6 TESTS FOR SILENCE. Certain applications require silent motors. Such motors are tested by mounting on a sounding booth. Inside the booth, the operator uses an Oscilloscope to duplicate the tone and thus determine the natural frequency of the motor's note. Knowing this, the cause of undesirable tone can be rectified

A STETHOSCOPE (Test No. 2) is used to detect alien noises which betray bearing faults or misalignment of bearings

7 MECHANICAL CHECK-UP. As motors pass through the electrical test, observation is made of bearing alignment and end-play to make certain that mountings and bearings are perfect. Air-gap gages check the running clearance between rotor and stator laminations. The rotating unit, consisting of bearings and rotor with shaft and key, is tested for static and dynamic balance

Ready to Apply

Ten liftable ideas for cutting costs or simplifying the day's work of the electrical manufacturer

Lifting Barrels with Hooks

THE Cutler-Hammer Manufacturing Company, Milwaukee, has worked out a way to handle barrels filled with heavy products, that in five years has not dropped a single package.

An electric hoist, equipped with a piece of rope and two hooks, picks up the barrels and moves them to the desired place.

The hooks grab the top of the barrel and the heavier the barrel the more secure the grip. If a barrel has no head, a block of wood inserted at the chime provides the necessary rigidity.

Heavy boxes and cases are also moved with this rigging. The possibility of damaging goods and injuring workmen is a remote one. J. J. B.

"Drop Deliveries"

"WE HAVE learned through the micro-motion study," says R. M. Blakelock at a meeting of the American Society of Mechanical Engineers, "the value of 'drop deliveries'; by a drop delivery is meant an arrangement whereby the finished article may be delivered (after a machine operation) by simply releasing it in the position in which it was completed, without the necessity of moving to dispose of it.

"This is not so important because of the time saved in transporting it to its destination as because it frees both hands so they may proceed simultaneously in unbroken rhythm, and rhythm is an important factor of skill."

Here's a Good Trick

ONE of two evils exists in many a factory. One of them is putting a box of parts on the floor and then tediously picking out the individual pieces. And the other is the alternative of using a lot of muscle, usually calling for the services of a helper, to lift the box up to bench height.

Both of these evils are obviated at the plant of the Appleton Electric Company by the device pictured below. An inclined table apron is attached to the end of a bench. To the upper edge of this apron is hinged an L-shaped piece.

When in its lowered position a lift truck deposits a skid-mounted box of parts. Then a hand winch pulls the L-shaped piece and its load up to the position shown. The parts then roll out on the bench.

L. I. T.

Up and Over

Dumping a box of parts on a bench is better than reaching down for a handful at a time

It Saves Several Helpers

This little one-man jack lifts a pole up into position to be worked on

No Helpers Are Needed Now

ABOUT two years ago the San Joaquin Light and Power Corporation's accident prevention committee started an investigation of the causes of numerous cases of strained backs sustained by linemen. It was discovered that lifting heavy poles from the ground onto the usual X-shaped framing jack caused most of these injuries.

It was found that what happened was that frequently not enough hands were available for the job. Other linemen perhaps would be some distance away digging holes or doing other work and the framer would attempt to lift the end of a heavy pole with two or three men when five or six should be used.

In an effort to correct this situation it was decided to see what could be done to develop more efficient equipment. The one-man framing jack pictured at the left is the result.

The reason for its inclusion in this magazine for manufacturers is that there are many jobs in a factory where this or similar equipment would save both strained backs and also bad practice of calling men away temporarily from regular production jobs to help out on purely muscle work.

S. W. G.

Collecting the Evidence

MANY companies have found that a prompt, written report by the foreman on the circumstances surrounding each accident is essential as a basis for accurate statistical records and a history of the company's accident experience. A form similar to the one reproduced below has been found helpful in providing effective accident reporting and has application in many a plant.

This form, which is a sort of composite made up from many gathered by the Metropolitan Life Insurance Company, includes those questions usually found on similar forms, which can be answered by the foreman and which are considered of considerable value to the execution of successful safety work.

It is designed to emphasize accident prevention as a function of efficient supervision. Questions, the answers to which usually must be obtained from employment or other records, are omitted. M. L. I.

File Number.....

FOREMAN'S ACCIDENT REPORT

Department or Shop..... Name of Foreman.....

When did accident happen? Date.....19.... Time.....A.M. P.M.

Did injured employee stop work?.....Date.....19.. Time.....A.M. P.M.

Name of injured employee..... Check number....

How long employed..... Occupation.....

Was he doing his regular work?..... If not, what was he doing?.....

Had you instructed him regarding hazards of his job?.....

If not, who had?..... When?.....

What is the apparent nature of his injuries?.....

Where did accident occur?.....

What machine, tool or appliance was involved?.....

Power or hand driven?.....

Was it guarded?..... Can it be guarded?.....

Was accident due to defective condition of property, floors, stairs, etc.?

.....

Describe .....

Describe how accident occurred.....

.....

.....

.....

Did you see the accident?..... Who else saw it?.....

1. ..... (Name) ..... (Check No.) 2. ..... (Name) ..... (Check No.)

3. ..... (Name) ..... (Check No.) 4. ..... (Name) ..... (Check No.)

What will you do to prevent a recurrence of this accident?.....

.....

When? .....

Date.....19.... Signed by.....

Simple but All There

To make it easy for the foreman to report accident information this form is handy

Factory Use for a Domestic Fan

Battery compounds harden quickly in a fan draft

A Cool Breeze Enjoyed by Batteries, Too

WHEN a storage battery is sealed with wax it takes a considerable time to cool if there is only natural cooling. But assembly on a conveyor calls for a speeding up of the cooling process. One battery company has solved this problem in a simple manner by mounting ordinary electric fans above the conveyor on inclined supports so as to direct the draft at an angle downward toward the tops of the batteries, as the illustration above clearly shows.

Here is an idea more widely applicable than merely to storage battery manufacture. G. H. T.

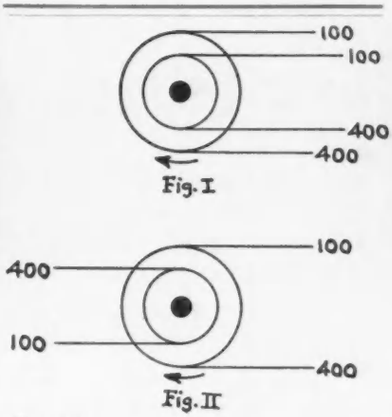
They Save Toes

GOGGLES were probably the first safety things to be worn by workmen but there are other articles more strictly apparel which play a large part in keeping workmen safe on the job.

Asbestos gloves are useful where hot materials are to be handled and safety shoes for use in foundries to keep hot metal out were early developments. Of later use were shoes with unusually stiff and strong box toes to protect against falling objects of great weight.

One way in which these shoes save toes at the plants of the Western Electric Company is pictured below. Ordinary shoes are no protection against the falling of a 90-lb. sheet of glass, but these safety shoes are.

"Armored" shoes prevent accidents



Upper:

The wrong way to belt up two pulleys to the same shaft

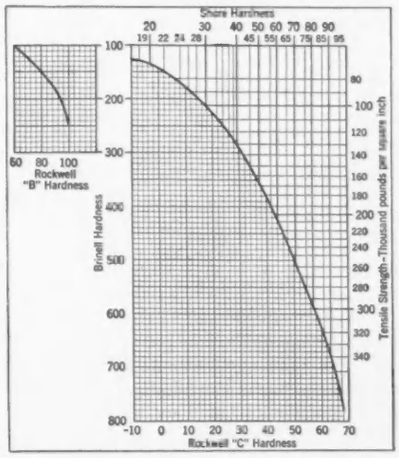
Lower:

The right way to do the same thing

A Common Transmission Error

A COMMON error in arrangement of pulleys and belts is shown in Fig. 1. The larger pulley is the standard pulley on an electric motor. The motor is underloaded. Somebody sees an opportunity to increase the load, so the smaller pulley is added. That is, the two pulleys are placed side by side on the same overhanging shaft and both belts pull against the bearing in the same direction. The total pull as indicated by the figures amounts to $(100 + 100 + 400 + 400) = 1000$ lb.

This is not good engineering practice because motor bearings are designed for a definite bending force. All bearings have their limitations, of course. If the two belts leave the pulleys in the same direction as shown in Fig. I, the design is wrong because the chances are that the bearing will not be able to withstand the combined leverage or bending moments. The outside pulley, being farther away, causes the bending stress to be greater in the bearing than that due to an equal pull on the inner pulley.



Conversions from one hardness scale to another or to tensile strengths are made at the intercepts with the curve crossing the main part of the chart

By so arranging the drives that the belts will leave in "opposite" directions, as shown in Fig. II, the bending stress will be less than would be the case with a single pulley and with the motor pulley fully loaded. Such a condition is all right. Here we have 500 lb. acting in one direction, which is exactly balanced by 500 lb. acting the other way $(400 + 100) - (100 + 400) = 0$. The belt at the left, Fig. II, is a top pull belt, true, but that is better than ruining the motor for the sake of two underpull belts.

Another point to bear in mind is this: Overhung pulleys on electric motors should *always* be operated as close to the bearing as possible. If you *must* run belts as shown in Fig. I, or if you *must* place the pulley at considerable distance from the motor bearing, use an additional outboard bearing. W. F. S.

Protected but Easily Inspected

Wire glass is used in this well built frame for protecting motors which project out into shop traffic

Well Caged

SOMETIMES the plant layout is such that motors have to project into aisles or other spaces where there is considerable passing. Under these conditions some sort of covering for the motor is desirable. One manufacturer has accomplished this by building the neat boxes of wire glass pictured above.

Since the sides and top are of glass casual inspection is easily afforded and numerous holes bored in the supporting framework provide adequate ventilation. W. B. T.

Perhaps you too have worked out little cost-cutting plans which are of value. If so, turn them in for use in this idea-exchange—a feature appearing each month in ELECTRICAL MANUFACTURING *under this heading "Ready to Apply." Ideas accepted will be paid for at a liberal contribution rate.*

A Fair Exchange with the Census Bureau

You give the government a prompt, complete report and the Census of Manufactures provides you with useful statistics never before yielded by a census report

UNDOUBTEDLY you or some one of your associates has long since seen a 14-page schedule headed "Census of Manufactures, 1929, Electrical Machinery and Apparatus." One of these forms has been sent you by the government and the law makes it obligatory upon every manufacturer to furnish census data.

But it is clearly pointed out on the schedule that "under the law, no one not a sworn employee of the Bureau of the Census will be permitted to examine your report, and no information can or will be given out by the Bureau of the Census to any person outside that Bureau, whether in Government service or in private life, which would disclose, exactly or approximately, any of the facts or figures in your report."

Census questionnaires have nothing to do with any law enforcement work of the government, such as is represented by the Federal Trade Commission or Department of Justice. The census is merely a huge fact-finding operation, and the facts furnished by one business organization are mingled with facts from another to make a composite whole.

If by any chance you have not yet filled out your report do so right away. Wholly aside from the desire to be prompt and to avoid difficulties with the government there is a selfish reason for getting the facts to Washington as soon as possible. For, the sooner the Census Bureau gets the facts the sooner those facts will be assembled, the returns tabulated and the results come back to you in usable form. One company may conceivably hold up the results of the whole industry.

It has always been a criticism of the Census that the figures are so slow in getting back to the people in compiled form as to diminish their practical value. To correct this situation is the purpose behind the unusual effort to get companies to expedite the handling of the questionnaires. Speed up your end of the job and the whole thing will be speeded up.

AND the facts and figures which come back to the individual manufacturer after this census will be more inclusive than formerly and should be of increased value to the electrical manufacturer. Nor can there be the just charge that the manufacturers of the country did not have a hand in framing the questions asked, for an advisory committee of manufacturers put in weeks of study on the subject before the census forms were planned. This committee sought the opinions of business men, economists and others with regard to such subjects as the industries properly covered by the census of manufactures, the limit which should be drawn as to the minimum size of the establishments to be canvassed, the areas for which statistics should be shown separately, the method of classification of industries, and the forms of tables to be used.

For instance, for the first time the Census of Manufactures calls for information on the practice of manufacturers with respect to the number of days that constitute the normal working week of their plants. Specifically, the inquiry is made as to whether the workers in each plant are on a six-day basis, five-and-one-half-day basis or on a five-day basis per week. During the past two or three years there has been much speculation on this subject, but exact facts of a nation-wide scope have not been available.

Migration of industry is another subject of inquiry that is being made for the first time. Movements of manufacturing which have been under way during the last decade have resulted in decreases in the requirements for skilled labor in one section of the country accompanied by increases in requirements in other parts of the country.

AGAIN, a trend of manufacturing away from established centers and from the large cities has been reported by some observers. Such a diffusion of manufacturing would have an influence on the employment conditions surrounding industry.

The employment of women is again the subject of inquiry. While these data were available in the reports of previous decennial censuses, the employees in factories have not been distinguished since 1919 in the biennial censuses.

Mechanization has brought about shifts in the character of workers required. Have these changes tended to increase the number of women in factories or has the opposite been the case?

In this connection, reference to the statistics of earlier censuses is of interest. To many it may come as a surprise to know that of every thousand wage earners in factories in 1909, 206 were women, while in 1919 the number was 201, a slight decrease.

In the case of those employed by manufacturing companies as clerks and in other similar positions, there were 362 women out of every thousand such workers in 1919 as contrasted with 242 ten years before. In numbers the women clerks and other similar workers increased from 140,000 to 374,000 or by 167 per cent.

MANUFACTURERS are also being asked to give information on the number of shifts per day and the number of hours of labor per week, and the data on these matters will be more extensive than at any census since 1919. In addition there will be the usual questions on the number of wage earners and salaried persons; the seasonal variations of employment; and on the growing use of power and power equipment, a subject of interest both to manufacturers and to factory workers.

Special studies of the subsequent tabulations are being made by the Census Bureau officials. Many new and valuable tabulations will be made which can be used as a basis for production and distribution studies.

The Census Bureau is also making special efforts to get the resulting statistics on manufacturing operations back to the manufacturers at as early a date as possible. But here again all depends upon prompt returns from the manufacturers themselves.

Are You Liable for a Defect in Insulation in Your Product?

Makers of electrical appliances may well bear in mind the decision reported here by Leslie Childs

AS a general rule of law, where a manufacturer turns out a product that is inherently or imminently dangerous, when used for the purpose intended, he may be held liable for all injury caused thereby. And in particular does this apply, to a considerable degree, to electrical machines and appliances.

In the light of which, the question of what may constitute an inherently dangerous defect in a machine becomes one of particular importance to electrical manufacturers. And, as an illustration of judicial reasoning upon this question, the following recently decided case is well worth a brief review.

In this case, the agent of a manufacturer sold an electric sewing machine, that was operated by a cord and attachment that fit into a wall socket. After demonstrating this machine, the agent disconnected the cord from the machine, and allowed it to hang over the machine still connected with the wall socket.

The buyer of the machine evidently understood this method of disconnecting the machine when not in use to be safe and proper, for thereafter when the machine was not in use she merely disconnected the cord from the machine, but not from the wall socket. In this situation, an infant child of the buyer about one year of age placed the socket on the cord that fitted into the machine in her mouth, and suffered serious and severe burns from the current coming through the cord.

For this injury, the instant action for damages was thereafter filed against the manufacturer of the machine, on the ground that the accident was caused by the furnishing of a defective attachment. In support of this contention, it was shown that the threads on the cap or attachment were defective in that they failed to hold the cap in place, and permitted it to slide down and expose the bare copper wires.

IN defense, the manufacturer, among other things, set up that it was not liable to the injured infant because it had no contractual relations therewith. Further, it was contended, that since the cord attachments were purchased from another company, this should relieve the manufacturer from liability. In addition, it was argued that the injury arose because of the negligence of the buyer, the mother of the injured infant, in leaving the attachment as she did where the child could get the socket in her mouth.

Upon the trial of the cause, a judgment in the sum of $10,000 was rendered against the manufacturer. The latter appealed, and the higher court in passing upon the questions raised reasoned as follows:

"The manufacturer of an appliance, which, if defective in construction, will become inherently or imminently dangerous when used for the purpose for which it was intended, owes a duty to the public, irrespective of contractual relations, and it has been held in many cases that he will be liable to third persons for an injury directly caused by negligence in failing to make reasonable inspection of such defective appliance, where the injury was sustained while the appliance was being used for the purpose intended. * * *

"A tool, machine, or apparatus for use in the home, which employs electricity, is such a dangerous instrumentality as would require the manufacturer or seller to use ordinary care in its manufacture and inspection, to the end that the article may be so insulated as to be reasonably safe for use. Danger to members of the family from a defective appliance of this character is one to be foreseen by the manufacturer who sells it to one of the members of the family. * * *

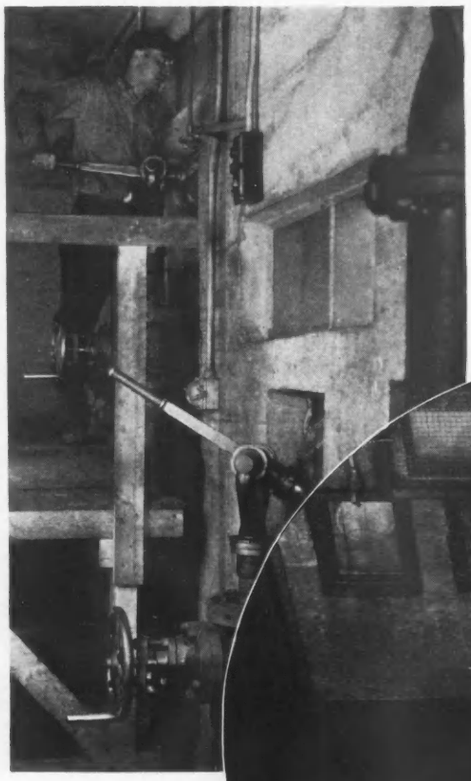
TO all intents and purposes, the defendant was the manufacturers of the attachment as well as the sewing machine. The mere fact that it purchased the plugs from a reputable manufacturer would not relieve it from the duty to make reasonable tests and inspection. * * * The machine was sold for the express purpose of being used in the home, and with knowledge that there were children of tender years there, and the danger should have been foreseen. * * *

"The evidence of the plaintiff (injured child) tends to show that the mother had no knowledge of any defect in the appliance; that at the time the injuries were sustained she had placed it in a position similar to that in which the agent of the defendant who sold it to her had himself placed it when he ceased to operate the machine. From this evidence the jury may well have found that the mother was not guilty of any negligence whatever, and that the negligence of the defendant, in the failure to properly inspect the appliance, was the sole and proximate cause of the injury sustained. * * * Judgment affirmed." (162 N.E.633)

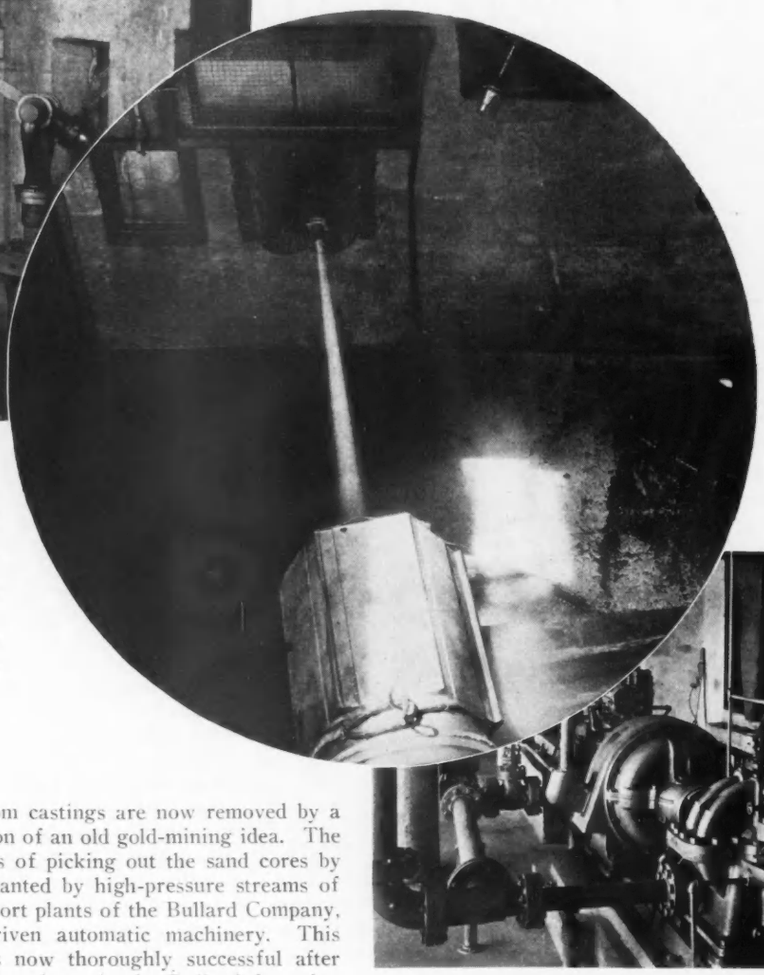
The foregoing case was carefully reasoned by the court, and the holding announced appears to be in accord with the weight of authority on the question involved. This authority taking the position, that manufacturers of electrical machines and appliances are liable for injury caused by defects, which render an article inherently dangerous, regardless of whether or not they have contractual relations with the injured person at the time of the injury.

In the light of which, it is obvious that the case reviewed constitutes a striking illustration of circumstances, under which an electrical manufacturer may be called upon to assume unexpected and substantial liability for injury.

Putting a Mining Idea to Work in a Factory

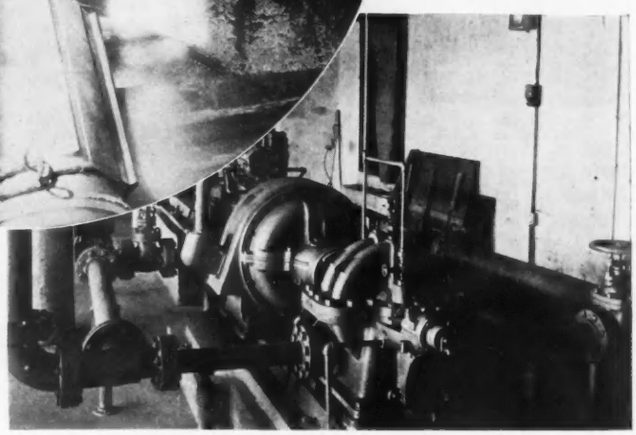


THIS man in the control room directs the jet. He can see what he is doing by looking through the window just above each nozzle



THIS is the business end of the nozzle, showing the jet directed at the casting under treatment. So that all openings in the casting may be reached it is mounted on a turntable

MOTOR-DRIVEN pumps consume 180 horsepower in building up a pressure of 425 pounds per square inch. Under this pressure 450 gallons of water are pumped per minute



SAND cores from castings are now removed by a novel adaptation of an old gold-mining idea. The tedious process of picking out the sand cores by hand has been supplanted by high-pressure streams of water in the Bridgeport plants of the Bullard Company, makers of motor-driven automatic machinery. This hydraulic method is now thoroughly successful after two years of testing and use in the Bullard factories.

Under pressure of 425 pounds per square inch, 450 gallons of water per minute are forced through seven-eighths-inch nozzles, and quickly wash out the sand cores around which the metal is cast. That pressure is built up by pumps which use 180 horsepower of electrical energy. The castings are set on a turntable mounted within a large concrete vault.

The turntable makes it possible to direct the jets, which are more or less fixed in position, at any desired angle. And the concrete vault with the jets operated from the outside solved the problem of housing the process without any element of danger to the operators. The operator can see what he is doing by looking through the protected glass windows arranged just above each nozzle.

On some jobs the savings by this method are spectacular. For instance from a four-ton casting with 34 cu. ft. of internal cored space and only two or three sizable outside openings, the sand core is now removed in two hours. The long accepted method of picking out the hard-baked sand with hand tools took 35 to 40 hours of dusty, disagreeable work.

On the average casting, the time for core removal is cut to one-fourth, and the cost is reduced 35 per cent in dollars and cents. Or on a tonnage basis in the run of foundry castings the net gain is about six dollars per ton.

The idea for the hydraulic washing was given to the officers of the Bullard Company by a man who some thirty years ago, turned high pressure hose on the scrap piles from gold mines and recovered considerable gold that had been left by earlier placer miners.

This development is typical of the willingness of progressive executives to accept, adapt and adopt ideas which have their origin in far different situations.

Facts, Figures and Trends

Fifteen Billion Kilowatt-Hours of Energy Lost Annually

Out of the 91 billion kilowatt-hours of electricity generated and made available for distribution by the electric light and power industry during 1929, only 76 billion ever reached the ultimate consumers, according to a statement issued by the National Electric Light Association.

This means that there is lost and unaccounted for approximately 15 billion kilowatt-hours, or, putting it another way, the companies must generate 91 billion kilowatt-hours in order to deliver 76 to their customers.

Applying this situation to the average rate for the United States produces an intresting situation. This average rate for all electricity sold to all classes of consumers is 2.57 cents per kilowatt-hour. But the industry does not get 2.57 cents a kilowatt-hour for all the energy it generates, because it only gets paid for 76 out of every 91 billion kilowatt-hours generated. In other words, it actually gets as a producer 2.16 cents a kilowatt-hour. If every kilowatt-hour actually generated and made available for delivery could be delivered to the consumers, the average rate would be 2.16 cents without affecting the gross income of the industry.

These 15 billion kilowatt-hours that are lost between the point of generation and the consumers' meters would supply all of the electrical energy used by the 20 million consumers of power and there would be enough left over to supply all the power sold by the industry to street railways and electrified railroads.

Increased Use of Electric Water Heaters in Switzerland

Statistics issued by the secretariat of the Swiss association for the use of water show that 124,000 electric heaters for domestic use were installed in Switzerland during the past year. This number includes 15,600 kitchen stoves, 16,800 water heaters, 12,700 little boilers for making tea or coffee, and 28,600 radiators and heating appliances.

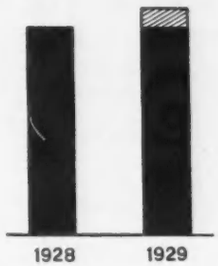
Capital Expenditures by Power Companies

Capital expenditures by the electric light and power companies for additions, betterments and new construction during the six years from 1924 to 1929, inclusive, exceed similar expenditures by the railroads, according to figures prepared by the Statistical Research Department of the National Electric Light Association.

During these six years the power companies spent for these purposes $4,865,000,000, while the railroads spent $4,809,959,000. It is interesting to note that, because of unprecedented demands for service, in 1924 the light and power companies spent $908,000,000, which is in excess of the estimated budget for 1930, and in 1925 spent $846,000,000, which is very close to the estimated budget for this year.

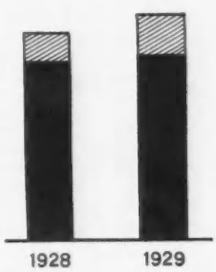
Electrical Equipment Industry Profits Show Increase

According to figures made available recently by the National City Bank of New York, there has been a noticeable increase in the net worth of the facilities of the electrical equipment industry and a proportionate increase in the percentage of return on this net worth.



Net Worth of Electrical Manufacturing Facilities

Profits on Net Worth



Per Cent of Return on Net Worth

The facilities of the industry had a net worth of $905,121,000 in 1928, and this amount had grown to $989,791,000 in 1929, an increase of 9.3 per cent in 1929 over 1928.

Net profits in 1928 were $142,364,000, and in 1929 amounted to $175,615,000, an increase of 18.3 per cent, while the per cent of returns on the net worth in 1928 and 1929 were 15.8 and 17.7 per cent respectively.

The Growth of American Power Plants

The growth of the electric light and power industry has been one of the most remarkable developments of the last century, according to the 1929 Commerce Yearbook.

Since 1902 the aggregate capacity of generators in electric stations has multiplied 13 or 14 times, while the actual output of these stations has multiplied 18 or 19 times as against an increase of only about 51 per cent in the population.

The United States has about half of the total world capacity of public utility electric plants. Norway, Canada and Switzerland are the only countries in which the output of current per capita exceeds that in the United States. Moreover, much of the Swiss current is exported or used by heavy traction electrification, while in the other two countries the paper making and electro-chemical industries consume a large proportion of the total. The United States is ahead of any other country in the general household use of electricity, and far ahead of most. Although Japan has the next largest number of domestic consumers, the amount of current used by each consumer is far smaller than in the United States.

German Electric Industry

The increase in the production of electricity in Germany is estimated at around 18 per cent for 1929, and this has stimulated the domestic market requirements for practically all kinds of electrotechnical equipment and especially for central station equipment, high tension transmission material and meters. High levels of production in the iron and steel, coal and potash industries, and the increasing use of electrically operated machinery in these industries, afforded a favorable increase in orders for electrical equipment. Orders for account of the chemical and machinery industries increased moderately.

Employment Conditions Show Improvement

Latest figures of the U. S. Department of Labor show a decided up-turn during the first half of January from November and December levels. Returns from 8000 establishments employing nearly two and one-half million workers indicate gains of 3.4 per cent at the end of the week of Jan. 6, and of 3.3 per cent at the end of the week of Jan. 13. All geographic sections and all but three or four industries showed increases.

Saving in Salvaged Lumber

Lumber salvage records at the Schenectady plant of the General Electric Company show that, for the first nine months of 1929, 2,166,981 board feet of lumber having a value of approximately $65,000 was salvaged. The Schenectady plant maintains a salvage lumber yard to which is consigned all waste lumber varying in size from heavy timbers down to crating scrap.

Two buildings have been equipped with machinery which turns old timbers and heavy pieces into lumber of useful sizes, which in many instances obviates the necessity of using new lumber. Smaller pieces are used for making crates and tote boxes.

Electricity in Chile

According to the Direccion General de Servicios Electricos, in 1928 the Chilean electrical industry operated with a mechanical horsepower totaling 205,316 of which 139,682 hp. was by water and 65,634 by steam plants. There were 159 plants, of which 55 used water power, 27 wood, 24 oil and 27 coal, while 26 were mixed plants.

The use of electricity generated from steam, water power and other sources has increased rapidly in recent years, production having been estimated 500,000,000 kilowatt-hours in 1920, 677,000,000 in 1924, 646,000,000 in 1925, 725,000,000 in 1926, 870,000,000 in 1927, and 1,020,000,000 in 1928.

Revised Standards for Copperweld Wire

Announcement has just been made by the Copperweld Steel Co. of Glassport, Pa., of the revised standards for Copperweld wire, shown in the following table. These standards for copper-covered steel wires make former wire standards for this type of wire obsolete.

WIRE TABLES

COPPERWELD WIRE AND STRAND

Bare, Hard-Drawn

"HIGH STRENGTH" and "EXTRA HIGH STRENGTH" Grades

Size (A.W.G.) Nom. Diam. (In.) No. of Wires	Actual Diameter (Inch)	Area (Square Inches)	Weight Per 1000 Feet (Lbs.)	Resistance Per 1000 Ft. (Ohms)		Breaking Load (Lbs.) "High Strength"		Breaking Load (Lbs.) "Extra High Strength"
				40% Cond.	30% Cond.	40% Cond.	30% Cond.	30% Cond.
SOLID WIRE, Bare, Hard-Drawn								
4	.204	.03269	116.	.636	.848	3,530	3,920	4,660
5	.182	.02602	91.9	.798	1.065	2,940	3,250	3,910
6	.162	.02061	72.8	1.008	1.344	2,430	2,680	3,240
7	.144	.01629	57.5	1.276	1.701	2,000	2,200	2,670
8	.128	.01287	45.5	1.615	2.153	1,650	1,800	2,190
9	.114	.01021	36.1	2.036	2.714	1,360	1,480	.....
10	.102	.00817	28.9	2.543	3,390	1,130	1,230	.....
11	.091	.00650	23.0	3.195	.....	900	.....	.....
12	.081	.00515	18.2	4.032	.....	710	.....	.....
STRAND, Bare, Hard-Drawn								
5/8 (7 No. 4)	.612	.2288	820	.122	.092	22,240	24,700	29,360
9/16 (7 No. 5)	.546	.1821	650	.154	.115	18,500	20,480	24,630
1/2 (7 No. 6)	.486	.1443	515	.194	.145	15,300	16,880	20,410
7/16 (7 No. 7)	.432	.1140	407	.245	.184	12,600	13,860	16,820
3/8 (7 No. 8)	.384	.0901	322	.311	.233	10,390	11,340	13,800
11/32 (7 No. 9)	.342	.0715	255	.392	.294	8,570	9,320	11,280
5/16 (7 No. 10)	.306	.0572	204	.489	.367	7,120	7,750	9,200
3 No. 6	.324	.0618	220	.452	.339	6,200	6,830	8,260
3 No. 7	.288	.0489	174	.572	.429	5,100	5,610	6,800
3 No. 8	.256	.0386	138	.723	.543	4,210	4,590	5,580
3 No. 9	.228	.0306	109	.912	.684	3,470	3,770	4,560
3 No. 10	.204	.0245	87	1.139	.854	2,880	3,140	3,720

Coefficient of linear expansion—.0000072 per degree Fahrenheit.
Modulus of elasticity—Solid, 24,000,000; Strand, 23,000,000.
Breaking load of 7-wire strand is taken as 90% of the sum of the breaking loads of the individual wires.
Breaking load of 3-wire strand is taken as 85% of the sum of the breaking loads of the individual wires.

Production of Electricity

The production of electricity for public use during 1929 is now estimated by the National Electric Light Association at 97 billion kilowatt-hours. This output equals that of all of the rest of the world combined. During the last seven years the industry added 13½ million kilowatts to its generating capacity; constructed nearly 50,000 miles of transmission lines above 22,000 volts; doubled the output of energy, and increased its customers by more than 11 millions. At the close of 1929 the total generating capacity was nearly 40 million horsepower.

Washing Machine Sales on Upward Grade

Approximately 6,700,000 electric washing machines are estimated to be in use in American homes, according to figures compiled by the Copper & Brass Research Association. Since there are about 19,000,000 wired homes in the United States, it is concluded that there is still a potential market of some 12,000,000 homes for new sales. Annual washing machine sales have increased progressively from 554,000 in 1923 to 870,000 in 1929.

On the basis of last year's rate of sales being maintained for the next few years, the association estimates that there is a potential market for approximately 19,000,000 pounds of copper per year in washing machines featuring copper parts.

Six Million Small Electric Motors Made Each Year

A very important item in the manufacture of electrical machinery is that of fractional horsepower motors, such as are used in vacuum cleaners, washing machines, ironing machines, sewing machines, refrigerators, oil burners, etc.

During 1927 the total production of this type of small motor was approximately 3,000,000, having a factory value of over $32,500,000. The increase in the production of this type of motor during the past few years has been remarkable, less than a million having been made in 1921 as compared with 3,000,000 in 1927. At the same time, the average value decreased from $17 to $11.30 at the factory.

The manufacture of individual lighting sets for sections not served by central stations has exceeded 40,000 for each year since 1923, the total for 1927 being in excess of 46,000.

A detailed list of 545 fractional horsepower motor applications was given on Pages 56, 57 and 58 of the May issue in an article entitled Here Is a Market for Electrical Equipment.

Household Electric Appliances in Cuba

Electric household appliances such as refrigerators, ranges, fans, heaters, radio sets, etc., are becoming more popular in Cuba and are regarded more as necessities than luxuries as formerly. Less sales resistance is being encountered, and the use of these articles is likely to increase in proportion to the amount of sales effort expended.

Electrical Patent News

A department for giving readers practical advice and useful information on patents, trade marks and designs

RAY BELMONT WHITMAN
Patent Attorney

WHEN should a design patent be taken out and when should a mechanical or ordinary patent be taken out? In other words, what is the difference between these two kinds of patents?
R. A. C., Seattle, Wash.

A DESIGN patent is directed to an invention in which the form or appearance of the invention is important from an æsthetic or ornamental viewpoint, whereas a mechanical or ordinary type of patent is directed to the function of the invention. Whenever possible take out a mechanical patent, for it is less easily avoided without infringement and therefore gives much better protection and better prevents competition. A design patent may often be avoided by more or less simple changes in the appearance of the design without affecting the value of the new appearance.

WILL the Patent Office issue a patent on the same thing to more than one inventor? ***R. E. T., Minneapolis***

NO. The Patent Office can only issue a patent to the first inventor, although it sometimes happens that later inventors also get patents on somewhat similar things which may be modifications of or improvements over something previously patented. It is necessary for a patentee before utilizing his invention to determine by an infringement search whether there are any such other patents previously issued on part of his invention, and which he would have to use in order also to use his own invention; for in that case he might infringe the claims of such prior patents and be estopped from the use of his own patent as a result.

READERS are invited to avail themselves of the free service of this questions-and-answers department on the subjects of patents, trade marks and designs. Simply address Patent Editor, ELECTRICAL MANUFACTURING, 461 Eighth Ave., N. Y. City

IS it possible for a poor man to make money out of a patent?
"Mechanic," Fredericksburg, Va.

IT certainly is. Some large fortunes have been built up by men who were originally poor and who made valuable inventions and obtained strong patents on them. Large corporations fear to be drawn into infringement suits over patents and will do all they can to avoid infringing. Where, however, there is an infringement and the owner of the patent has no funds to sue the infringer, he can often make an arrangement with the patent attorney to conduct the litigation on a contingent fee basis.

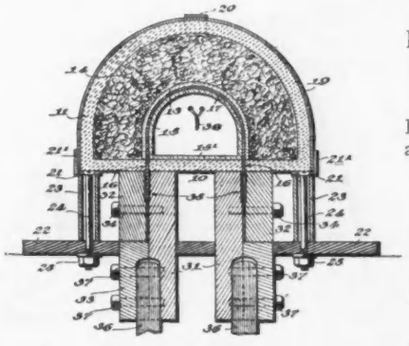
WHAT countries grant the strongest patents? ***"Attorney," New York***

THE United States and Germany, since both these countries make rigid priority searches and the patents are therefore in a sense semi-adjudicated when issued. Canada, Great Britain, France and most of the other countries grant patents which are largely in the nature of registrations because the searches are not so thorough.

Recent Patents of Electrical Apparatus

Electric Furnace

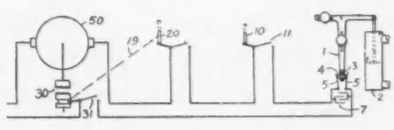
1,757,895. Issued to Andrew J. Asch, New York City. It covers an electric furnace comprising an outer muffle, an inner muffle removably housed within the outer



muffle, a resistance heating element having the form of a relatively thin sheet of platinum of rectangular form interposed between the inner of the opposed walls of the outer and inner muffles, and having the free end portions thereof projecting outwardly of a wall of the outer muffle, and circuit connectors engaged with the projected end portions of the resistance element.

Electric Controlling Device for a Scale

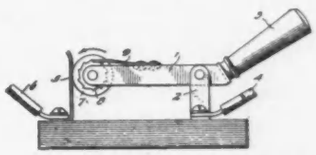
1,757,072. This patent by Frederick G. L. Boyer Dayton, Ohio, which has been assigned to Dayton Scale Company, is for



use in an automatic scale. It involves an electrically operated mechanism and a controlling circuit therefor; and means, automatically operating controlled by moving parts of the scale, for preventing the closing of the operating circuit until a load has been placed upon the scale and the scale has attained a condition of equilibrium.

An Electric Switch

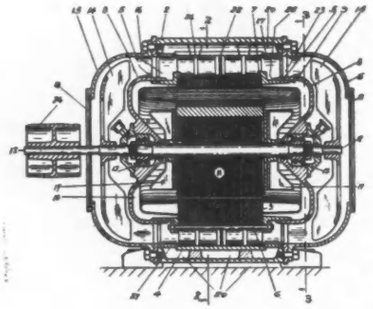
1,758,793. Jay J. Hogan, Stratford, Conn., who obtained this patent, assigned it to The Bryant Electric Co., Bridgeport,



Conn. The switch has a fixed contact and a moving contact adapted to be in engagement therewith for a part of its movement, the contacts being adapted to make a rubbing surface engagement with each other when the switch is operated in one direction, and to provide a rolling contact in the other direction.

Totally Enclosed and Ventilated Motor

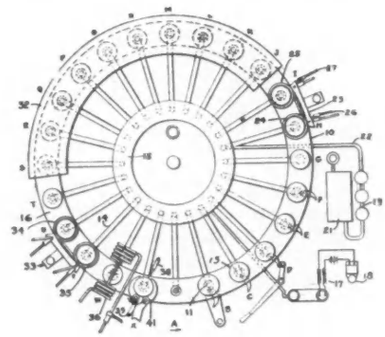
1,759,415. Hugo Perlesz, Cedarburg, Wis., obtained this patent and assigned it to American Electric Motor Co., Milwaukee. In this motor there is a frame, a stator carried within the frame, but spaced therefrom to form an air chamber. The



frame has at least one outlet from this chamber to the atmosphere. The stator is composed of groups of laminæ so constructed that the laminæ of one group have perforations near their outer periphery to form air ducts. The laminæ of another group are so constructed beyond the winding slots as to form radial air vents leading from the air ducts to the air chamber. A fan is carried on the rotor shaft, and there is a shield having air admission means for covering the fan.

A Method of Heat-Treating Electrical Devices

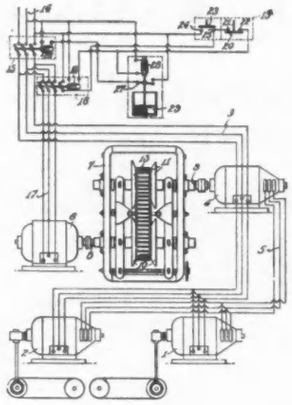
1,758,004. This patent by Harry D. Madden, Montclair, N. J., has been assigned to Westinghouse Lamp Co. It in-



volves the method of heat treating an electron emission device comprising a bulb inclosing a plurality of electrodes which consists in subjecting the electrodes to high frequency induction heating in the presence of an inert gas for obtaining a uniform heating of the electrodes.

Synchronous Variable-Speed Electric Machine Drive

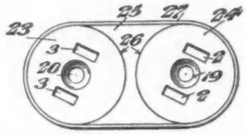
1,757,734. William R. Perry, Columbus, Ind., obtained this patent and assigned it to Reeves Pulley Co., Columbus, Ind. It comprises a power system and the combination with a plurality of induction machines having phase wound primaries and secondaries respectively electrically interconnected, a source of current supply for the primaries of the machines, means for driving the rotor of one of the machines



in a direction opposite to the rotary magnetic field in the primary, a switch for controlling a supply of current to the primaries of all of the machines and a means of insuring delay of the opening of switch until after machines have stopped.

Dual Electrical Outlet Device

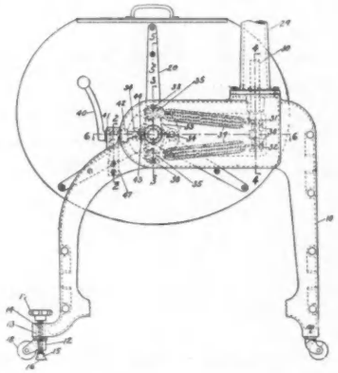
1,757,748. Issued to Harold E. Slade, Glen Ridge, N. J., and assigned to Beaver Machine & Tool Co., Inc., Newark, N. J. This dual electrical outlet comprises an elongated insulating housing including body and closure members having longitudinal



grooves in the opposing surfaces for the reception of a duplex electrical conductor. The body is formed of a pair of cylindrical outer portions and an intermediate saddle portion, a peripheral band surrounding the body members to maintain them in assembled relation.

Washing Machine

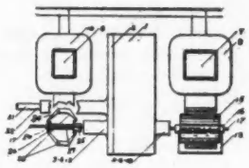
1,757,106. Issued to Vincent G. Apple, Dayton, Ohio. This washer is of the os-



cillating type. There is a tub oscillating means comprising a shaft, two oppositely disposed crank pins carried thereon and driven thereby, two studs associated with the tub positioned oppositely away from the center of oscillation, bearings carried on the studs and the crank pins, and coil springs having at their ends hooks which partly encircle the bearings to connect them under resilient tension.

Synchronous Electric Motor

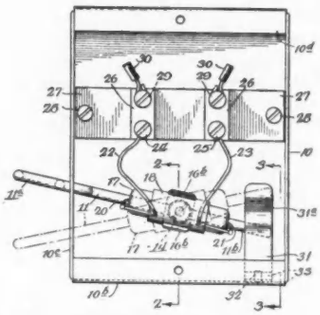
1,758,417. Issued to Robert Valverde, New York City. In a self-starting synchronous motor including means for producing a rotating magnetic field, an induction starting rotor comprising a sheet of hardened steel ribbon substantially cor-



rugated to form a fluted star-shaped cylinder thereby to offer an elongated and tortuous magnetic path through the interpolar space of the magnetic field.

Electric Switch

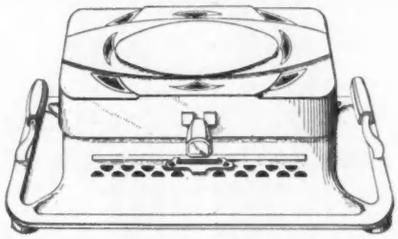
1,758,629. William James Traxel, Chicago, obtained this patent and assigned it



to the Liquid Carbonic Corporation, Chicago. This switch comprises a casing, a lever pivotally mounted in the casing and having a handle extending through the casing. On this handle within the casing is mounted a mercury tube switch so that it will tilt with the handle.

Toaster

80,734. Brian A. Lapin, Philadelphia, Pa., assignor to Proctor & Schwartz Elec-



tric Company, Philadelphia, Pa., a Corporation of Pennsylvania. Term of patent 14 years.

An ornamental design for a toaster, substantially as shown.

RIVALS Keep on Thinking

EVEN if within the next few weeks we begin to speak of the "recent" depression, some of the results, started by the last jolt, will still be getting under way. The actual dangers to some concerns will be just starting.

Every time there is a bad jolt, everybody instantly starts looking ahead and thinking "fast"—even the people who hate it most.

The instant the curve seems to hesitate or flatten out, some people just naturally say to themselves—

"That is good; the bad part is all over. Changes won't be necessary; old designs, equipment, costs, values, are not obsolete after all; and people are again going to be willing to pay for them.

"Now we can breathe easily. We were doing some fast and painful thinking. But, thank goodness, now we can stop."

Just when they are in the greatest danger, and ought to be doing their fastest and most thorough planning and action!

Because competitors do *not* stop. Not all of them. Some of them go right ahead with the new thinking that the jolt started with the planning, and the changes, the advancements and re-equipping, which they believe will give them an earlier, stronger upturn, and a better lead in the New Prosperity.

* * *

Industry has now awakened to the fact that too often the REAL drag on profits, and on success in competition is the using of WRONG MATERIAL.

The New Thoroughness recognizes the supreme importance of one indispensable factor —the question—

Are You THINKING IN THE RIGHT MATERIAL?

NVF

Write today for FACT-SHEETS OF INDUSTRY No. 1,—giving practical knowledge which hitherto has not been readily accessible —Mailed FREE to any worker or executive. Limited Edition—Write NOW, stating work you do, your company's product or business, and whether request is for self. Address
Librarian (Dept. S-4) National Vulcanized Fibre Company, Wilmington, Delaware

NATIONAL VULCANIZED FIBRE COMPANY

Makers of Special Phenolites; "righter" Bakelites; "Peerless" insulation; many kinds of Vulcanized Fibre; Material-Handling equipment, etc.
Serving America's industries from smallest to greatest.

Facts Worth Knowing About Patents

These for Instance:

An idea must be "useful" to be patented (except in the case of a design patent.

◈ ◈ ◈

So long as evidence of invention is signed, dated and witnessed it is valid no matter how informal it may be.

◈ ◈ ◈

Even a minor may take out a patent. The law reads, "any person."

◈ ◈ ◈

Many investors fail because they go outside the field in which they have a major knowledge.

◈ ◈ ◈

Some of the more than 12,000 patent attorneys in the United States, instead of conducting a professional practice, work on the "once only" plan, getting the maximum fee for the minimum of allowable work. These should be avoided.

By Ray Belmont Whitman

Patent Editor,

Electrical Manufacturing

OUR laws say that "any person" may obtain a patent in the United States. The person may be a foreigner or an American citizen, adult or minor, male or female, black or white, Jew or Gentile, a college graduate or educated in the "school of hard knocks." There are no exceptions. "Any person" means anybody and everybody who complies with the legal requirements.

The true inventor, if alive, must always sign the application for a patent. If anyone else signs, the patent is invalid, and so of no value. There may be more than one inventor, in which case they are called "joint inventors," and each must sign the application papers as such. They then obtain a "joint patent." No one of them can obtain a patent for an invention jointly invented by all. Also, independent inventors of distinct and independent improvements in the same machine can not obtain a joint patent for their separate inventions.

When May a Patent Be Obtained, and on What?

Read the following paragraph carefully. It will answer many questions which are usually not understood.

"A patent may be obtained by any person who has *invented* any *new* and *useful* art, machine, manufacture, or composition of matter, or any new and useful improvement thereof. But it must not have been known or used by others in this country before his invention and not patented or described in any printed publication in this or any foreign country before his invention, or more than two years prior to his application. And it must not have been patented in a country foreign to the United States on an application filed by him or his legal representatives or assigns more than twelve months before his application, and not in public use or on sale in the United States for more than two years prior to his application, unless the same is proved to have been abandoned."

To be patentable, then, the idea must be "new." Of that, more later. Also, it must have been "invented"—that is, conceived by the inventor through the exercise of the creative faculty, and not merely by imitation. Again, the idea must be "useful"—that is, applied to the production of a practical result. There is an exception to this last statement in "design" patents, which cover merely the aesthetic appearance or ornamentation of the article, and are not directed to a practical or "useful" function.

Now having found out just what a patent is, let us next consider, generally, the kind that fail and those that succeed.

Patent Failures

In the beginning, it must be admitted that the majority of patents issued to inventors, week in and week out, do not return to them even the cost of taking out these patents, not to mention the time and expense of developing the ideas to the point of filing the applications in Washington. There are many reasons for this unfortunate condition, some of which it is the purpose of this article to explain, and to suggest means of correcting or largely eliminating. Other reasons exist which cannot be removed, and so they will be clearly pointed out, in the hope that many of these useless patents may in the future be eliminated.

In spite of the many patent failures, it is nevertheless true that for every ten of them that result in a loss to the inventor, there is one, or possibly two, that returns a profit so great as to many times wipe out the combined loss from the failures, and leave a handsome surplus besides.

Newspaper accounts frequently attest to the more sensational of these successes. A few years ago Major Armstrong, who invented the regenerative circuit for radio receivers, is said to have received for his patent rights a half million dollars from several large electrical companies. In this author's personal experience, one inventor of a non-set automatic stop for phonographs was paid $125,000 in royalties by one large phonograph company, in less than three years, and for rights secondary to their own.

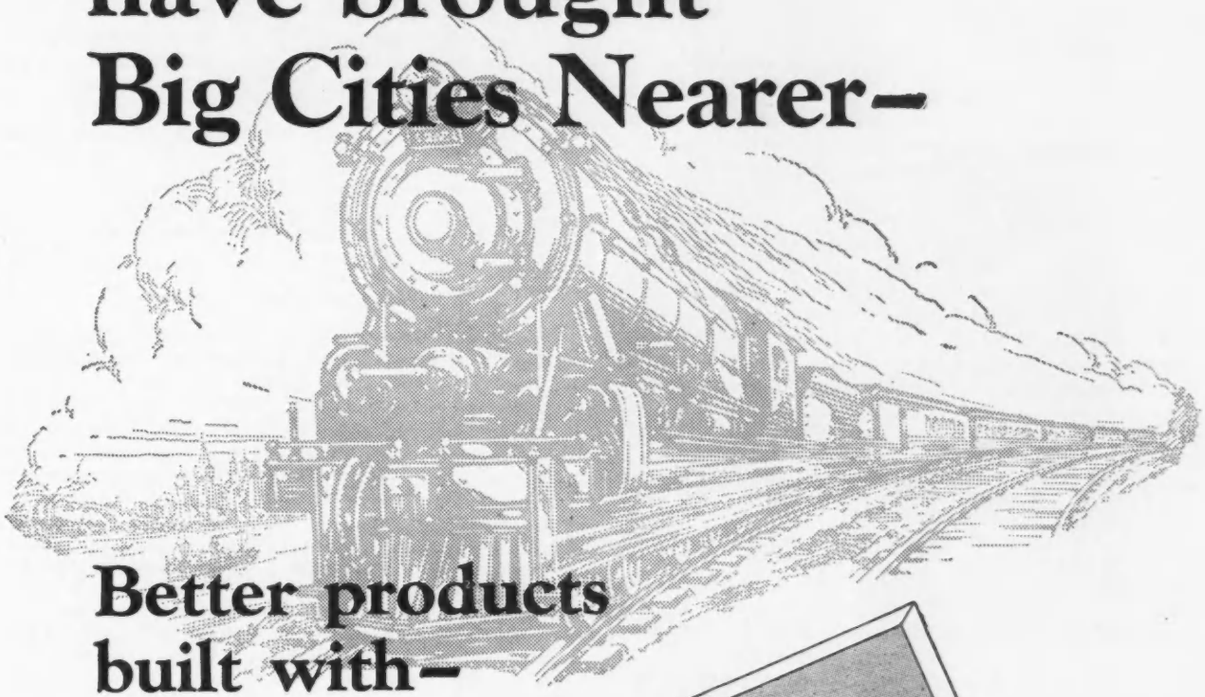
But the inventor who seeks to profit under the patent laws must know upon what to focus his inventive abilities. This is a very large question but a little general advice will prove of value. Of course, it goes without saying that many inventors fail because they go outside the field in which they have a major knowledge.

Again, direct your inventive talents in line with your mental capabilities and your financal station in life. The experimental work and the cost of the first model necessary to determine the practicability of highly technical machines runs into tens of thousands of dollars, and this burden must often be shouldered by the inventor before he can hope to get anyone to finance him further.

Incidentally this very condition is often the salvation of the poor inventor, since it forces him to direct his patent aims in the more simple fields where perhaps the larger reward has usually been found.

The cost of patenting and perfecting a simple invention is usually so little that any poor man can afford the risk, whereas with complicated and more technical conceptions, large sums must invariably be spent before even being able

Great Trains have brought Big Cities Nearer–



Better products built with–

NEWTON NEW-HAVEN

Die Castings

are cutting down those great spaces between initial inquiries and the satisfaction that leads to faster sales.

THE NEWTON DIE CASTING CORPN.
146 Munson Street New Haven, Conn.

ATTRACTIVE PRODUCTS *economically produced are half the selling battle.*

NDC-26

to determine if the subject-matter of the invention is of a useful or money-making character.

The Evidence of Conception

Having now conceived an idea which the inventor feels is valuable enough to go further with, he should, as the next step, protect himself against any one else, either unscrupulously or accidentally, proving priority of invention and the right to a patent. One way to do this is to prepare what is known as an "evidence of conception." The inventor writes a detailed description of the complete invention in his own words, on a typewriter or with pen and ink, and makes also any necessary rough sketches to illustrate the invention (unless it be a chemical process or like invention where this is impossible). On the last page he affixes his name and the date, either in the presence of two witnesses, preferably persons outside his family, or better, before a Notary Public, who will attest his signature as of that date, and affix the notary seal. This original document should always thereafter be retained by the inventor with other valuable papers. If it has been prepared on the typewriter, which is preferable, a carbon copy should be made and used to submit the invention to his attorney later.

By this simple means, the inventor is always able to prove first conception of his invention at the date noted, and this is often of great importance, for many times others are inventing in the same field and without knowledge of their competitors' activities. Occasionally, too, where attempts are made to improperly appropriate the inventor's idea, he is able later on to substantiate his prior rights to the invention and a patent thereon. Such an instance as this last occurred to a client of the author, who won a suit on a phonograph motor patent that went up to the Supreme Court, largely upon an evidence of conception which he had written informally on the back of a dance program, but which he had been careful to properly sign, date and witness.

What Records to Keep

It is highly important also that the inventor maintain a similar record in writing, properly dated and witnessed, giving other information which also may be needed later, including: (1) the date that the invention was first disclosed to others, with their names and the circumstances of the disclosures; (2) the date when the first sketches and working drawings were made—the drawings themselves to be suitably signed, dated and witnessed; (3) the date when the first operating model was made, together with information as to who made it, and the original bills for material, where obtainable; and (4) all the models themselves, made during the development of the idea, should be carefully preserved. All this data enters into a proper prosecution of what is called an "interference," in which the application for patent sometimes becomes involved.

The inventor, having now established his or her "evidence of conception," may take the next step, which is:

Finding a good patent attorney.

There are some 12,000 or more patent attorneys registered to practice in the United States Patent Office, and of these probably 2000 get most of their income from the preparation and prosecution of patent applications, and their exploitation and litigation. These men are all professionally-trained men, and, with perhaps some rare exceptions, honest and ethical in all their dealings. However, they, like doctors, dentists, or other professional men, vary in their degree of ability.

Some attorneys are too young and with too limited experience or education to understand fully how to properly protect a valuable invention. Others are too old to be at the height of their mental power, or not aggressive enough in combating the Examiner's objections, during the prosecution of the case, to obtain all the protection that the inventor is entitled to.

Some attorneys get their clients through advertising methods, and instead of conducting a professional practice, work on the "once only" plan, getting the maximum possible fees from the inventor for the minimum allowable work. Needless to say, this latter class of attorneys do their work so poorly that their patents are usually of little or no practical value.

Other patent attorneys devote most of their time in court litigation, and very little to Patent Office practice, or the preparation and prosecution of patent applications into patents. So they have little real skill in such work, and especially in the drafting of the "claims" in patents, which is the important and really protective part of these legal documents.

Again, many patent attorneys are merely lawyers, with but little knowledge of the sciences or engineering and so are seriously handicapped in patenting inventions, especially if they are very technical.

Choosing the Right Attorney

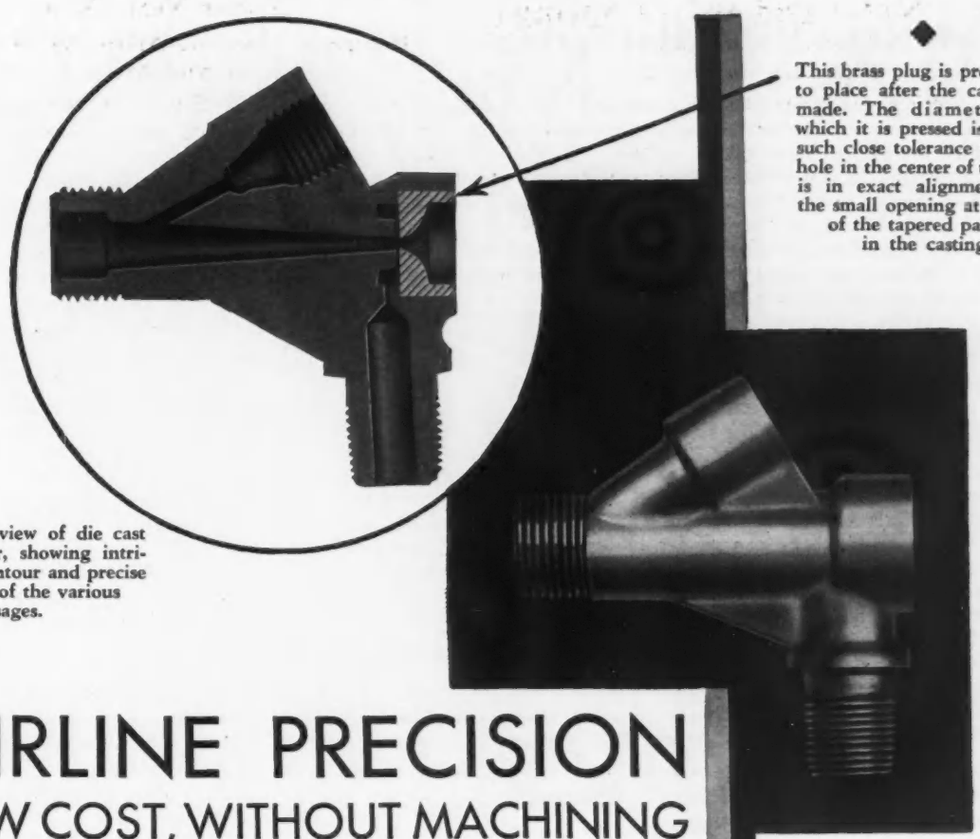
The ideal patent attorney is one who not only has a thorough working knowledge of patent law and procedure, and especially Patent Office practice, by virtue of a proper education and long experience in the work, but who is also a graduate engineer and with a successful experience in that profession. Such a man, whose mind is trained both logically and analytically, is best able to properly represent an inventor.

(The Patent Office, in fact, requires each of its Examiners, who examine all inventions before deciding to grant the patents, to be technical graduates, trained in scientific subjects. And the time is not far off when this same requirement will be made, to apply to patent attorneys, for they are required to do not only everything the Examiner must do, but many things also which are far more technical. At present, however, any young law student who has completed a course of study in general law and been admitted to the bar, can present his certificate and become registered to practice as a fullfledged patent attorney!)

If the inventor does not know of a really able attorney with a record for taking out good patents, he should try to locate some inventor who has made a monetary success from his patents, and find out whom he employed. Where, however, this is impossible, then engage some well-known attorney who represents, or has represented, some large corporation—which would ordinarily be real proof of his ability—and who may be located in one of the large cities.

Another test in determining a good patent attorney, and perhaps the best of all, since it is one that almost never fails, is to *check up some past work of the attorney before you engage him.* This may be done by asking the one whom you may be considering hiring to loan you, say, eight or ten copies of patents, chosen at random, which he has prepared, as evidenced by his signature on their drawings. Then put these patents through the method of analysis to be explained later under the heading "How to Analyze the Real Protection in Your Patents." If the results show that the particular attorney's work is not considerably above the average, based upon this analysis, consult someone else, and repeat the test until you finally locate an attorney whose work does measure up to these requirements.

Since your attorney's skill and knowledge of patenting is going to have much to do with your success with your inventions in the future, you should leave nothing undone to get a very good one in the beginning; for having once found such a man you will probably want to retain him on all such matters in the future, and this association will, as the years go by, become increasingly valuable, and you will learn more and more how to cooperate with him and he with you. It is by such coordination of effort between attorney and client that the best successes come. Having once chosen your attorney, you should put your complete trust in him, and follow his advice, although there is no harm done in checking up his work from time to time.



This brass plug is pressed into place after the casting is made. The diameter into which it is pressed is cast to such close tolerance that the hole in the center of the plug is in exact alignment with the small opening at the end of the tapered passage in the casting.

Cross-sectional view of die cast vacuum booster, showing intricate interior contour and precise relationship of the various passages.

HAIRLINE PRECISION
at LOW COST, WITHOUT MACHINING

THE Kingston Vacuum Booster is the primary operating unit of the vacuum tank used in Kingston vacuum-feed fuel systems for automobiles. The vacuum booster, itself, has no moving parts and its efficiency depends entirely upon the precise relationship of the various air passages incorporated in its design.

Because of the close tolerances to be maintained, there was little hope of die casting this part successfully, until Milwaukee Die Casting Engineering devised a die to meet these exacting requirements.

Die Casting this part has greatly simplified its manufacture. Costs have been materially reduced and it is no longer necessary to rely upon costly, precision machining operations to insure the exact relationship of the various openings and passages.

This particular achievement is but one of the many difficult production problems solved by Milwaukee Die Casting technicians during their twenty years of service to a wide variety of industries. They would welcome an opportunity to apply the knowledge and experience, so acquired, to your problems . . . without cost or obligation.

MILWAUKEE DIE CASTING CO.
289 Fourth Street Milwaukee, Wis.

Additional Facts About This Unusual Casting

1. It is made of a zinc alloy of high tensile strength.
2. All holes and air passages are cast in.
3. All external threads are cast, and are not subsequently machined (chased).
4. Internal thread is tapped after casting is made.
5. Interior surfaces are cast exceptionally smooth.
6. The casting is delivered complete, ready for assembly.

MILWAUKEE
DIE CASTINGS AND BEARINGS

What NEMA Did at Hot Springs

(*Continued from page 27*)

The Motor and Generator Section decided that motor frame dimensions will not be included in the revised standards which are soon to be issued.

At the Section Council meeting, three main subjects were covered—collection of statistics, unform cost accounting and issuance of a handbook for Section officers.

The Cost Accounting Committee, among other business, decided to develop new material on cost accounting procedure to supplement the present manual which is devoted largely to general accounting methods.

Relations Between Major and Minor Companies in the Electrical Industry

(*Continued from page 28*)

They lie in his flexibility to change; his ability to meet the changing conditions; in the more direct contact of his responsible officials with the actual negotiations; in capitalizing the superior service he can render in his locality by reason of accessibility, assurance of delivery and prompt and competent response in time of need. They are very real advantages indeed, and when fully realized and intelligently fitted to his specific problem practically assure his success.

But a major concern of the small producer should be in the general health of the industry and he has an equal responsibility with the large manufacturer in its promotion.

Relations Between the Electrical Manufacturer and the Utility

(*Continued from page 29*)

quantity at what may be considered reasonable prices.

The utility point of view often fails to take in the need for the cost of manufacturers' sales methods. The manufacturer is expected to develop, provide the manufacturing plant and equipment, buy the raw material, manufacture the goods, take the manufacturer's risk of marketing, advertise and otherwise create and promote the market for about half of the retail price.

Yet when the utility is merchandising, it expects 40 or 50 per cent of the total price to cover only its sales expense and possibly a small profit.

The over-emphasis by many utility men of lower prices to the public for appliances offers another clash of opinion. Sales promotion is usually more important than price. Public acceptance brushes away many cobwebs of supposed sales resistance. This requires mutual consideration.

Local versus national advertising is often a bone of contention. The local utility man often cannot see why an equivalent share of the manufacturers' national advertising cannot be appropriated for local newspaper advertising in connection with local campaigns. He needs to understand better the theory and economics of national advertising and the place of local advertising in relation to it. He should realize that the circulation of national advertising in his own locality is a definite local force in promoting the electrical idea involved in the class of merchandise advertised.

Manufacturers in thinking of the expense to themselves in marketing their products in the promotional stages are apt to overlook the cost of the utilities in developing *their* local market.

Manufacturers are apt to expect too much from central station personnel in giving their time and attention to national problems. Except in the case of holding company executives, these men have local jobs and naturally local interests. It is hoped, however, that chief executives will see the local advantages eventually to be derived from national activities.

Other NEMA News

Recognition for Fire Alarm and Watchman's Service Systems

A CONSTRUCTIVE program for appropriate recognition of proprietary fire alarm and watchman's service systems was presented to the National Fire Protection Association at its convention in Atlantic City on May 14 by the Signalling Apparatus Section of the National Electrical Manufacturers Association and the Association of the Fire Alarm Industry. The program offers the assistance of these two bodies in classifying the various systems and in securing from insurance and rating organizations the allowance of proper credit for use of the systems. The proponents of the program state that experience has shown that increased use of adequate systems will benefit not only the makers of the systems but also the users and the public.

The program was offered to the NFPA for its primary action and copies were transmitted to the National Board of Fire Underwriters, the Underwriters' Laboratories, and insurance rating makers and appliers for their coordinated actions.

The proposals of the NEMA Section are as follows:

1. To request the National Board of Fire Underwriters to recognize and promulgate the properly classified standards for signaling systems according to their relative and actual merit from a fire and casualty protection standpoint, and that the Board recommend and promulgate recommended statutes, ordinances, commission orders, etc., calling for the use of suitable signaling systems for such premises as have fire and casualty hazards, warranting such requirements.

2. To request the National Board of Fire Underwriters to join with NFPA and NEMA in requesting of the appropriate fire and casualty insurance rating schedule makers the allowance of proportionate insurance credits in their schedule making, to correspond with the relative and actual value of the classified protective systems.

3. To request the National Board of Fire Underwriters and insurance rating schedule makers to join with NFPA and NEMA in requesting the various insurance rating bureaus and the various Boards of Fire Underwriters and the various State insurance rating bodies, to apply the standard insurance rating schedule credit allowances for such protective systems.

THE Association of the Fire Alarm Industry suggested that the Signalling Committee of NFPA include the following steps in its procedure:

1. That the Signalling Committee hold at least one annual meeting well before the annual convention, inviting in advance all suggestions and distributing these to members, so that the meeting will be most effective.

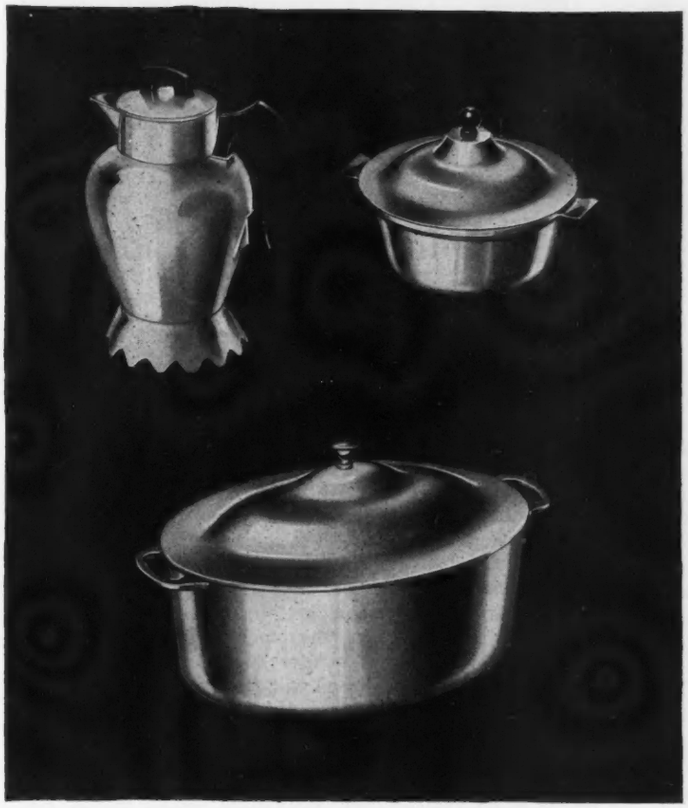
2. That the Signalling Committee afford at its annual meeting opportunity for those making suggestions to give the reasons therefore.

3. That the Signalling Committee immediately undertake through a properly constituted sub-committee a classification of types of protective systems, calculated to give proper weight to accumulated experience as to the relative value of each class of system.

4. That the Signalling Committee undertake to bring together in a separate pamphlet all necessary standards for proprietary systems as distinguished from central station systems, and grade various systems according to the measure of protection afforded.

5. That the Signalling Committee assist the Fire Exit Drill and similar committees to include only references to or excerpts from the protective system requirements in place of the different and even conflicting provisions which such other committee standards will contain if this coopera-

ALUMINUM WARE AT ITS FINEST . . .



When Die-Cast to an *Even Thickness* by STEWART . . .

The die-casting of fine, durable aluminum cook ware is one of Stewart's latest achievements. Skillful application of die-casting to these home products by Stewart's expert engineers, die-makers and operators results in a quality product. And a quality product that is within the price-range of the average pocketbook.

Stewart can apply die-casting to your particular product as skillfully as it has to aluminum ware. Stewart can reduce your production, assembling and finishing costs. Stewart can give your product added strength and quality!

Our new "Engineers' Die Castings Handbook" is now available. It contains valuable information for you. Write for your copy.

Call in a Stewart engineer for information about die-casting as applicable to your problems. Or why not send blue prints or samples for quotations, today?

Stewart

DIE CASTING CORPORATION
4500 Fullerton Avenue, Chicago, Illinois
DETROIT + PITTSBURGH + DAYTON
ST. LOUIS + NEWARK + CLEVELAND

tion between National Fire Protection Association committees is not effected.

Mr. C. C. Skiles of the Autocall Company represented NEMA at the meeting and W. J. Smith of Edwards & Company, Inc., represented the Association of the Fire Alarm Industry.

Preferred Voltage Ratings for AC Systems and Equipment

THE report on Preferred Voltage Ratings for Alternating Current Systems and Equipment, under preparation by a joint committee during the last two years, has just been issued by the National Electrical Manufacturers Association and the National Electric Light Association. Schedules of preferred voltage ratings are given for generators, motors, transformers and general apparatus such as disconnecting switches, fuses, oil circuit breakers, etc.

The associations which issued the report feel that if these ratings are applied so far as practicable and as rapidly as conditions will permit, considerable financial benefits will result through use of standard apparatus and parts instead of special. There will be less development cost, greater quantity production and more satisfactory replacement and repair service.

The ratings are based on the principles in the report of the joint committee issued in October, 1928. Later, detailed schedules and tables of preferred voltages for various classes of apparatus were worked out for practical application and are included in the publication. This is the first document which contains all the preferred voltages and principles under one cover.

Copies may be obtained from either association at 420 Lexington Ave., New York, N. Y. The price is 30 cents to members and 50 cents to non-members. Discounts are allowed on quantity orders.

How to Manufacture Coil Wedges

(*Continued from page* 33)

stored at a relative humidity of 60 to 70 per cent to give good results.

The curves in the accompanying illustration show the moisture characteristics of a good grade of wedge fiber ⅛ in. thick. Curve "A" shows the rate of drying when material is placed in an oven at 100 to 110 deg. C., indicating that it dries rapidly to a moisture content of about 2 per cent. Below this value it dries very slowly. Likewise, fiber which has been thoroughly dried out, takes up moisture rapidly until it has about 1½ per cent moisture, even at ordinary atmospheric conditions. This is shown by curve "B." The curve is drawn for an atmospheric condition of 70 per cent relative humidity and 20 deg. C., and shows that the maximum moisture content for this condition is about 6½ per cent.

By protecting the fiber with varnish or paraffin, the rate of change of moisture can be reduced very much and by storing at a lower relative humidity, the ultimate moisture content may be reduced in proportion. No attempt should be made to use fiber in production with a moisture content below 2½ per cent, as it becomes brittle and loses its mechanical strength as the moisture content is reduced below this point.

As has been suggested, the wedges should be machined to the proper width so that they will drive with a snug fit. If the wedges are too wide they will probably be damaged in driving, and if too narrow they will be loose, or become loose, and eventually fall out in service. There is, however, no general rule for determining the exact width to make wedges for a given machine. Such factors as the type and size of the punching, the method of punching and assembling the laminations and the care used in filing the groove, control the relative width of the punched groove in the lamination and the width of the wedge which will drive satisfactorily. The difference in width may be as much as 15 to 16 mils for large machines, while for small machines 5 mils may be sufficient. It is necessary to determine the allowances for each type and size of machine, after which it is not difficult to produce coil wedges which are serviceable and reliable.

In making the type of wedges shown in the heading illustration, precaution should be taken to taper one end in such a way that when it is driven into the slot over the coil it will not damage the coil insulation.

Wage Incentives in Material Handling

(*Continued from page* 52)

divided entirely in accordance with work performed within the group.

Two varying phases of material-handling work will be used as an illustration of what has been actually accomplished in the way of establishing incentives. First, that of an industrial-trucking scheme covering the entire East Pittsburgh plant of the Westinghouse Electric & Manufacturing Company, and second, the method of payment for a group handling raw and finished material in a motor-manufacturing department.

Industrial trucking for the plant is centralized in one department whose responsibility is to furnish prompt and adequate trucking service on call from any production section. Trucks are controlled and service is given on a "taxi-cab system." Stations are established at four places in the plant in charge of a dispatcher who receives by phone or by direct word all requests for service, and dispatches trucks in accordance with such needs. Each station comprises a group, with the dispatcher as group leader. Payment is based on "loads," record of which is taken from truck requisitions made out by the section securing service. Since these same requisitions are the basis of billings for service rendered, there is slight chance of any requisition being received except those for actual service renderd.

Studies were taken covering all types of loading in the district covered by the group. These studies covered loading, unloading, running time, and delays. From a large number of studies, time values were selected which covered an average load under average conditions; such figures were secured for both types of trucks (platform and lift) in use as well as for trailers.

From the foregoing it will be seen that no general rule can apply to this type of work; each is a separate problem. Common sense and a full knowledge of the work involved are just as necessary as time-study engineering skill. The group plan is peculiarly fitted for such work, and averages are used to a large extent in determining values.

The number of workers required to perform this work after measurement and incentives have been established has been greatly decreased, in some cases more than 50 per cent, and when it is realized that material handling sometimes composes as much as 80 per cent of the labor content of a manufactured article, it can be really seen that the time, training, and effort placed into such work pay large dividends both to the company and to the worker.

G-E Insulating Varnishes for every need in every industry

Where there's G-E VARNISH —*there's dependability*

GREAT generators, husky railway motors, small electrical apparatus—General Electric dependability is sealed in every one if they're treated with G-E Insulating Varnish.

For a generation General Electric has been manufacturing and using the best varnishes for every purpose . . . using the best of them on G-E products. *You* can use them, too. *You* can benefit by this broad experience.

You need only specify your exact requirements. General Electric can meet them with varnishes high in dielectric strength . . . tough to withstand abrasion, heat, oil, weather . . . flexible or hard . . . quick-baking or air-drying . . . clear or black—*every* kind.

For full data, write to Section M-327 today.

GENERAL ELECTRIC

MERCHANDISE PRODUCTS

MERCHANDISE DEPARTMENT • GENERAL ELECTRIC COMPANY • BRIDGEPORT, CONN.

Asphalt Composition vs Hard Rubber in Battery Jars

(*Continued from page 37*)

rely upon cotton fiber very largely for strength, and asphalt for acid resistance. The cotton has very poor acid resistance, and no kind of asphalt is thoroughly acid proof.

A rubber container of average quality, except for breakage, will last almost indefinitely. Any aphalt container, even if unbroken, is slowly affected by acid until it leaks either through the walls or partitions, or both.

Uniformity of Dimensions

Rubber is put into the mold cold and the container is taken out hot. Asphalt is put into the mold hot and the container is taken out cold. Principally for this reason, in making asphalt containers, the mold is made with less allowance for shrinkage than in making rubber containers. With asphalt there is both less shrinkage and less variation in shrinkage and, consequenty, more uniformity of dimensions. Furthermore, at ordinary temperatures, there is less warpage in stock with asphalt than with rubber.

Uniformity of Quality

With rubber we have to contend with variations in the degree of vulcanization. An undervulcanized container will be too soft and will bloom—that is, the sulphur in the mixture comes to the surface. An overvulcanized container is too brittle.

With asphalt, the greatest possibility of variation is in the flow of the material under pressure of molding. In the asphalt we rely upon the cotton very largely for strength. For maximum strength the cotton fibers should interlock, but where the material folds or butts in the flow of molding, the fibers do not interlock and there are weak spots.

I think there has been more difficulty with asphalt containers on account of weaknesses caused by imperfect flow and knitting in molding than with rubber containers on account of variations in vulcanization.

How the Price Figures

The cost of the raw material in an asphalt container is lower than that in a rubber container. This will always be true as far as anybody can foresee. Furthermore, similar mold and press equipment will produce about three times as many containers in asphalt as in rubber. This makes the manufacturing overhead expense per container much lower for asphalt. The labor in one case is about the same as in the other, the advantage, if any, being in favor of the asphalt. Therefore, the cost of manufacture with asphalt is less than with hard rubber. The industry has just about reached bottom as regards cost to make. The difference in cost for large scale manufacture is about 15 cents per container.

Summarizing, the asphalt container is more uniform in dimensions and cheaper to make. In all other important respects the rubber container is equal or better. I have heard a few battery manufacturers say that they have less trouble with asphalt than with rubber, but by far the majority have the opposite opinion. If both kinds of containers could be obtained at the same prices, I doubt if the use of asphalt would be very great.

In recent years the asphalt people have made more progress in quality and methods than the rubber people. There was more room for improvement. It is possible that the asphalt container may be still further developed to a point where it is at least equal to rubber in all important respects. In the meantime, I think each kind of container has its place. The fact that the use of asphalt containers is now so much greater than the use of rubber containers is proof enough that asphalt "gets by." Present-day economic pressure forces all of us to use, in the bulk of our manufacture, what will "get by" rather than "something better."

On the other hand, there is a tendency in the battery business, the same as in the tire and other businesses, to make "heavy duty" or "super-quality" merchandise. Such merchandise, whether it is right or wrong, carries a higher margin of profit. If you are going to make a battery better than the one that will just "get by," how can you invest 15 cents per battery to better advantage than by using rubber containers?

In fact, the cost of using rubber containers is in most cases admitted to be less than the difference in the cost of the containers, on account of less grief in assembly and in service.

And now about standardization. We cannot build stocks because there is so little standardization in your requirements.

Right now we are attempting to standardize the dimensions of push type covers, and I recommend to you particularly as much standardization as possible of both containers and covers for truck and bus batteries.

The N. B. M. A. has its technical committee, and there is a hard rubber division of the Rubber Association. The more we can cooperate along the lines of standardization, the less we parts manufacturers will have to spend for molds and other equipment; the more we can use standardized and automatic equipment, the more evenly we can manufacture throughout the year, building and stocking where necessary in advance of actual requirements, and the lower we can keep our costs and prices.

"We Might Better Have Said ——"

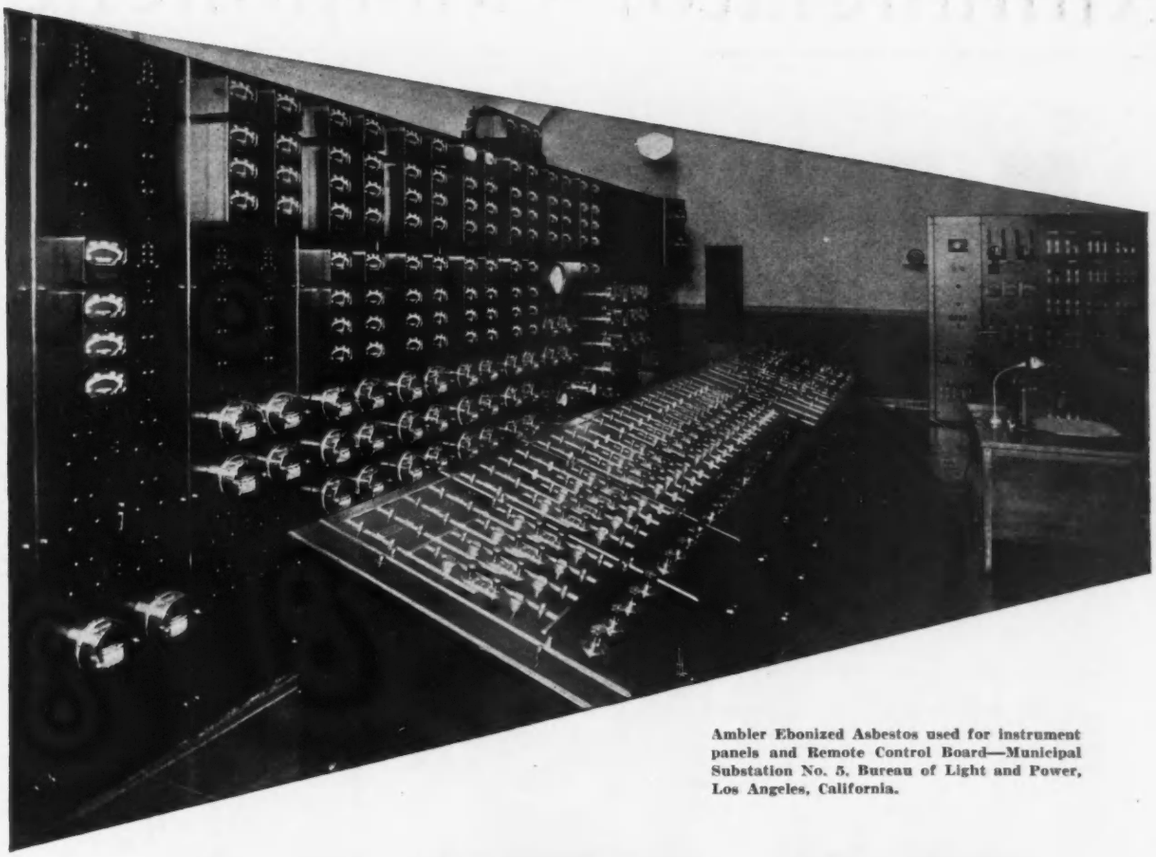
IN THE article appearing in our May issue relating to the recent addition to the plant of the Weston Electrical Instrument Corporation, it was stated in error that the new building that was described had been constructed "without a definite idea on the part of the management as to the use that would be made of it when completed."

Of course such a statement could not be accepted literally, since management of the type that has been responsible for the growth and expansion of the Weston Electrical Instrument Corporation would hardly embark upon heavy expenditures, particularly in connection with additional buildings, without having a very definite and concrete idea of the need and use for such an edifice.

It happened that during 1929 the sales volumes of the company in question was expanded at a rate very appreciably in advance of that which had been anticipated, and it was known to be imperative that additional room be provided for manufacturing purposes with a minimum of delay.

What we attempted to state in our preceding article was that the management of the Weston Electrical Instrument Corporation recognized this necessity for expansion and gave out its contracts for the new building before it had thoroughly prepared its plans with respect to the exact utilization of the new space. It is interesting to note that before the new building was completed, the space had been very efficiently allocated and the new building was brought into service with a minimum loss of time and with maximum efficiency, whereas these increased manufacturing facilities could not have been so quickly acquired had the building been delayed until complete details as to occupancy had been finally determined.

THE EDITORS.



Ambler Ebonized Asbestos used for instrument panels and Remote Control Board—Municipal Substation No. 5, Bureau of Light and Power, Los Angeles, California.

AMBLER

ASBESTOS PRODUCTS FOR THE Electrical Industry

Public Utilities and electrical manufacturers everywhere have accepted Ambler Ebonized Asbestos as ideal for switchboard and panel work. Its electrical and mechanical qualities, plus its ready workability, have built up a great and constantly growing demand.

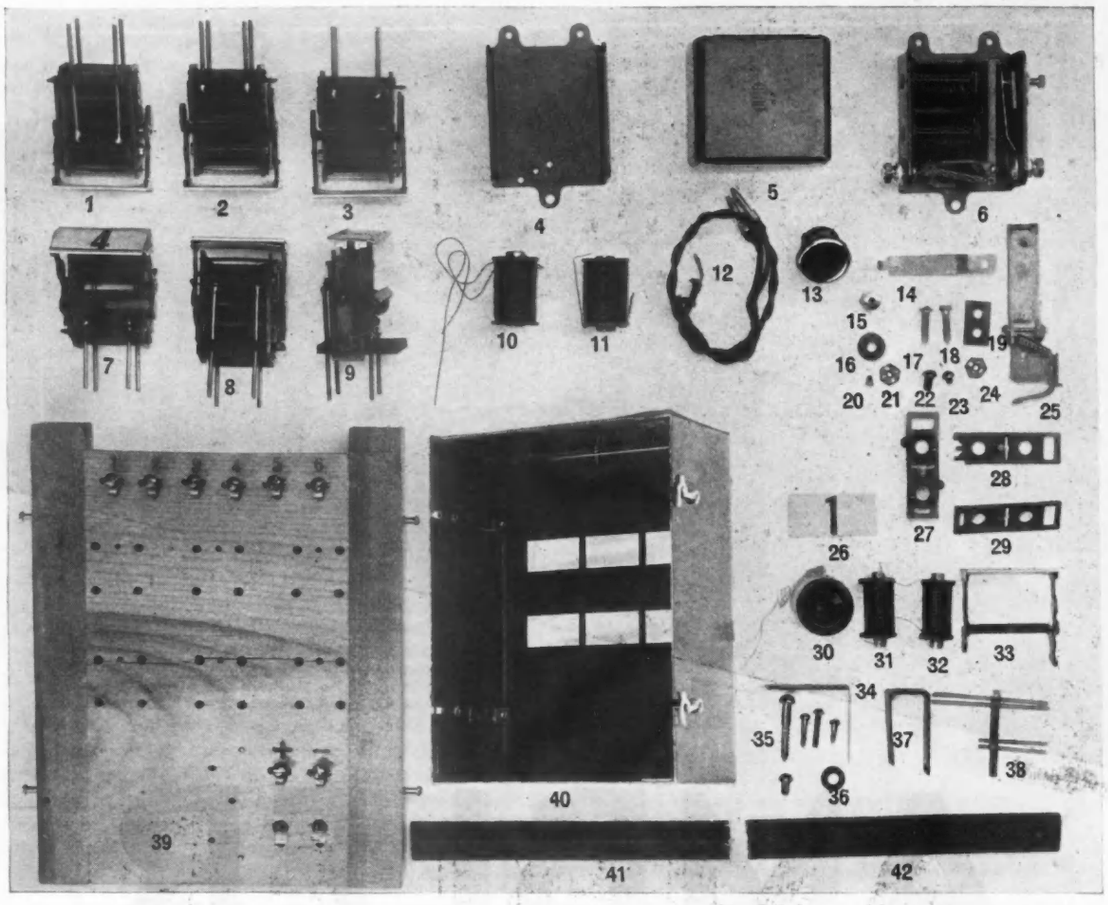
The Ambler Asbestos industrial products include also Ambler Asbestos Lumber, Corrugated Sheathing, Cold Moulded Products and Ambler Asbestos Shingles. The new Ambler electrical catalog explains these products, with real engineering data. Have you your copy?

Ambler Asbestos Shingle & Sheathing Company

Ambler, Penna. St. Louis, Mo.

AMBLER-EBONIZED-ASBESTOS

Annunciator Components



ELECTRICAL MANUFACTURING *acknowledges the assistance of The Auth Electrical Specialty Co., 422 E. 53rd St., New York, in the preparation of the illustration above and the compilation of the following table of electric annunciator components. The illustration is comprised of the various parts of the annunciator, while the table lists the materials from which it is made*

Table of Parts and Raw Materials Used in Annunciators

Part No.	Quantity	Title	Material	Part No.	Quantity	Title	Material
1, 2, 3, 7, 8, 9	6	Annunciator indicators	Steel, copper, fibre and insulating materials	23	2	Screws	Bronzed steel
				24	6	Screws	Steel, nickel plated
				25	2	Contactor arms	Stamped steel, spring steel, fibre
4	2	Buzzer boxes	Lacquered steel	26	6	Number cards	Cardboard
5	2	Buzzer box covers	Lacquered steel	27, 29	6	Annunciator columns	Steel, fibre
6	2	Buzzer mechanisms,	Steel, copper, fibre	28	6	Annunciator columns	Steel, copper
10, 11	4	Buzzer solenoids	Copper, steel, phenolic material	30	1	Spool	Porcelain, insulated wire
12	1	Cord	Wire, machined copper, insulation	31, 32	12	Annunciator solenoids	Steel, fibre, copper
				33	6	Indicator arms	Stamped steel
13	1	Push button	Copper, fibre, nickel	34	6	Spring catches	Steel, spring copper
14	2	Contact elements	Spring copper	35	20	Screws	Bronzed steel, brass
15	4	Connector nuts	Steel, nickel plated	36	12	Washers	Fibre
16	2	Washers	Phenolic material	37	6	Solenoid supports	Stamped steel
17	2	Screws	Steel, nickel plated	38	6	Annunciator bases	Copper, fibre
18	2	Make and break screw	Steel, nickel plated	39	1	Mounting board	Varnished maple, copper
19	6	Insulating elements	Phenolic material				
20	1	Machine screw	Steel, nickel plated	40	1	Annunciator cover	Sheet metal, spot-welded
21	6	Nuts	Steel				
22	2	Screws	Bronzed steel	41, 42	2	Spacers	Wood

LARGEST EXCLUSIVE MANUFACTURERS OF COILS IN THE U. S.

5 GOOD REASONS WHY EASTON QUALITY COILS ARE *Right* AND *Not Expensive*

1. ***Materials and Structure*** — All materials used in the manufacture of Easton Quality Coils must meet with the most rigid tests. Easton Coils are either of the multiple paper interlayer type or the random or solid wound type. Easton recommends vacuum treatment, varnish or compound, to render all paper interlayer wound coils moisture proof.
2. ***Performance, Uniformity and Endurance*** — Easton Coils have a long and impressive record for superlative performance, endurance and uniformity which is proved by continued patronage from outstanding manufacturers who have specified Easton Coils exclusively for years.
3. ***Manufactured to Exacting Specifications*** — Easton Coils are made to your specifications or to specifications supplied you by our long experienced engineering department to meet your individual requirements.
4. ***Economy*** — The Easton multiple paper interlayer coil assures uniform layer winding at a minimum cost. All types of Easton quality coils are manufactured in a modern plant where reduced costs are passed on to you.
5. ***Easton Free Engineering Service*** — The Easton Coil Company has gained an outstanding reputation by assisting the engineering and manufacturing divisions of important firms to design coils that qualify to exacting specifications. Send your specifications to Easton. All information and data furnished to our engineering and data department will be held in strict confidence. Samples and quotations promptly furnished.

EASTON COIL COMPANY

EASTON, PA.

P. O. Box 237

LARGEST EXCLUSIVE MANUFACTURERS OF COILS IN THE U. S.

200 Radio Manufacurers Show New Sets

TWO hundred radio manufacturers, a decrease of about 90 over last year, placed their latest model radio receivers on display at the sixth annual radio trade show held at the Civic Auditorium, Atlantic City, June 2-6. Several of the large companies, including Radio Corporation of America, Victor, General Electric, Westinghouse and Atwater Kent, occupied space at the show, but had no apparatus on display. They plan not to reveal their new sets until later in the summer.

With screen-grid tube sets and electro dynamic loud speakers predominating, the equipment on display indicated no radical changes since last year. Most of the refinements were mechanical and electrical, and for the most part were designed to improve tone quality. There was no indication of a general adoption of the pentode tube, as was anticipated by some radio men. Almost every manufacturer exhibiting had on display a radio-phonograph combination. The console cabinet was most prominent, with table models almost completely absent.

In addition to tone improvements, automatic volume control, provision for remote control tuning and some means of quickly identifying a station when it is tuned exactly right were the chief other improvements generally noticed. Prices range about the same as last year. There was little change in cabinet design.

Attendance at the show exceeded 25,000, including manufacturers, jobbers and radio dealers.

Trade Practices Discussed by Fixture Men

Trade practices harmful to the well-being of the lighting equipment industry were discussed at a meeting of manufacturers held in New York City during May under the sponsorship of the Artistic Lighting Equipment Association. Contributions to jobbers' catalogs, freight allowances and special concessions to favored jobbers or distributors were declared unethical.

Nema-N. E. L. A. Committee Agrees on Voltage Ratings

A joint committee of the National Electrical Manufacturers' Association and the National Electric Light Association has agreed on preferred voltage ratings for alternating-current systems. The ratings are given in a series of tables published in the recently released report of the joint committee.

The ratings cover generators, motors, distribution transformers, substation transformers, transformers for use with generators for supplying higher voltage systems, transformers for reversible tie purposes, and general apparatus such as disconnecting switches, fuses, oil circuit breakers, etc.

Central Stations Sponsor Western Heating School

A National Industrial Heating School was held from June 3 to 14, inclusive, with sessions in Los Angeles from June 3 to 11, and in San Francisco from June 12 to 14. The program included lectures by experienced industrial heating specialists and inspection trips through industrial plants. It was sponsored by the Industrial Heating Committee, Commercial National Section of the National Electric Light Association, with the assistance of the Pacific Coast Electrical Association.

Formica Host to Delegates at Gear Convention

An event coincident with the meeting of the American Gear Manufacturers Association in Cincinnati, May 1 to 3, was a luncheon given the delegates by the Formica Insulation Company, Cincinnati. A visit by bus to the Formica plant and to the Cincinnati Milling Machine Company followed the luncheon. Addresses were made to the delegates by George Markland, president of the Philadelphia Gear Company, and D. J. O'Conor, vice-president and general manager of the Formica company.

An Appliance Stylist

DEFINITE progress toward enhancing the beauty, grace and symmetry of electrical appliance has been achieved by Edison General Elec. Appliance Co., under the direction of R. E. Patten (above), chief stylist

Testing Society Will Hold 33rd Annual Meeting

The American Society for Testing Materials will hold its thirty-third annual meeting at the Chalfonte-Haddon Hall Hotel, Atlantic City, June 23 to 27. The program will include reports on electrical-heating, electrical-resistance and electric-furnace alloys and electrical-insulating materials.

Iron and Steel Men to Hold Buffalo Meeting and Show

A convention and exposition of the Association of Iron and Steel Electrical Engineers will be held at Buffalo, N. Y., June 12 to 20, inclusive. Technical sessions will be held at the Hotel Statler, while the iron and steel exposition will be held in the Broadway Auditorium. The Electric Engineering Division program will be held on Wednesday, June 18.

Refrigerator Simplification Booklet Is Offered

The division of simplified practice of the Bureau of Standards, Washington, D. C., has issued a booklet on the simplification of refrigerator ice compartments. The booklet, known as SPR-109, may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 10 cents each. It establishes door widths and heights and horizontal clear depths from inside of door to inside of rear wall for front and side icers having ice capacities of 25, 50, 75, 100 and 150 lb.

Piano Company Announces Entry Into Radio

Announcement has been made that Story & Clark, piano manufacturers, are about to enter the radio field and will soon produce a complete line of receivers embodying the newest developments. Story & Clark Radio Corporation, which is a subsidiary of the piano company, is located at Chicago. The manufacture of the sets will be accomplished at the Grand Haven, Mich., plant.

Lovell and Dressel Railway Lamp in Merger

F. H. Lovell & Co., established in 1864, and Dressel Railway Lamp & Signal Company, established in 1884, have combined as the Lovell-Dressel Company, Inc., with headquarters and plants in Arlington, N. J. The Lovell company is known for its electrical marine fittings and aviation lighting equip-

SPECIAL PORCELAINS by "THOMAS"

NO MATTER how intricate the design, *Thomas* can produce it in hard vitreous porcelain. *Thomas* porcelain parts are precision made . . . and uniform . . . a feature most desirable where assembly with metal fittings entails close fits. Modern equipment and great production facilities assure unusually prompt deliveries.

¶ *Send blue-print, sketch or model for price estimates.*

The R. Thomas & Sons Company

Established 1873

Lisbon, Ohio, U. S. A.

New York Boston Chicago

ment, while the Dressel company has made illuminating equipment for railroads. Under the combination the old lines will be continued, but the Lovell lines of airport and airplane lighting equipment will be emphasized. The officers are: S. Hallett Lovell, chairman of the board; A. D. Hobbie, president; F. W. Dressel, vice-president; J. C. Wylie, vice-president, and R. C. Stractzman, secretary and treasurer.

Meter Devices Moves to New Location

Meter Devices Company, Canton, Ohio, manufacturer of meter test switches, test blocks and meter accessories, is now in production at its new location, 3115 Tuscarawas West, Canton. The company was formerly identified with the Superior Switchboard & Devices Company of Canton, and had been manufacturing and marketing meter devices under the latter name for a number of years. T. J. Newman, former president of Superior, is now at the head of Meter Devices Company.

Magnavox Corp. Merges with Amrad Business

The merger of the Magnavox Corporation, 4250 Horton St., Oakland, Cal., and Amrad Corporation, 207 College Ave., Medford, Mass., has been effected by the directors of the two companies. The new company will be known as Magnavox Company, Ltd., and executive offices will be in Cincinnati.

Both companies are owners of patents on radio receivers and condensers, and the purpose of the merger, according to James E. Hahn, Amrad president, will be to concentrate on the exploitation of radio accessories. Other companies in the accessories field will be acquired in the future.

Wheeler Insulated Wire Buys Acme Products

Wheeler Insulated Wire Company, 378 Washington Ave., Bridgeport, Conn., has purchased the Acme Products Company of Boston. The plant of the latter company has been moved to Bridgeport, where the manufacture of coils is now being done.

New Research Laboratory for Aluminum Company

Aluminum Company of America, Pittsburgh, Pa., has recently completed a new building for its research department, Aluminum Research Laboratories, which have grown to such an extent as to necessitate larger quarters. The building is located at New Kensington, just outside of Pittsburgh, and it is well equipped with modern apparatus of many types. An official editorial inspection day was held May 20.

W. N. Matthews Corp. Plans New Building Addition

W. N. Matthews Corporation, 3722 Forest Park Blvd., St. Louis, Mo., recently let contracts for a three-story addition to their main factory at the above address. The addition is to be finished early in fall.

Retirement from Fibroc Corp. Announced by V. R. Despard

Victor R. Despard, until recently treasurer of the Chicago Mica Company and the Fibroc Insulation Company, has announced the disposal of his holdings and his retirement, temporarily, from active business. For more than a score of years Mr. Despard has been associated with the electrical industry, and this connection, together with his activities in the National Electrical Manufacturers Association, have combined to make him one of the most widely known men in the electrical industry. One of his early connections was with Pass & Seymour, Inc., of Syracuse, N. Y. Later he was associated with the McGill Manufacturing Company of Valparaiso, Ind., leaving them about a year ago to take over a large interest in the Chicago Mica Company and the Fibroc Insulation Company.

V. R. Despard

Mr. Despard plans to spend the next few months in travel and study, but it is predicted that he will then return to some phase of the electrical industry.

Coming Conventions

National Electric Light Association.—Annual convention, San Francisco, Cal., week of June 16, 1930.

National Electrical Manufacturers Association.—Annual meeting at Old Point Comfort, Va., October 20-24.

Institute of Radio Engineers—Toronto, Canada, Aug. 18-21.

Electrical Maintenance Engineers.—Convention at Breakers Hotel, Cedar Point, Ohio, June 19-20.

Illuminating Engineering Society. — Twenty-fourth annual convention at Hotel John Marshall, Richmond, Va., Oct. 7-10.

Association of Iron and Steel Electrical Engineers.—Convention and exposition at Buffalo, N. Y., June 12-20. Technical sessions at the Hotel Statler; exposition at the Broadway Auditorium.

Institute of Radio Engineers.—Meeting at Toronto, Canada, August 18-21. Harold P. Westman, 33 W. Thirty-ninth St., New York.

Norgren Line Introduced by Conn. T. & E. Corp.

A special meeting of sales representatives of the Tiffany Division of the Connecticut Telephone & Electric Corporation, Meriden, Conn., was held recently at Chicago for the purpose of introducing the line of the Carl A. Norgren Company, Denver, Colo., manufacturer of automatic, hydraulic and pneumatic lubricators and couplings. Both the Connecticut and Norgren companies are units of the Commercial Instrument Corporation of Delaware.

Acme Electric Appoints District Agents

Acme Electric & Manufacturing Company, 1444 Hamilton Ave., Cleveland, Ohio, has appointed the following district representatives for their line of power transformers, chokes, audios and auxiliary equipment: Clark & Baehr, 1400 W. 25th St., Cleveland, in Ohio, Indiana and Michigan; L. B. Weyburn, 128 N. Wells St., Chicago, in Chicago and northern Illinois; M. J. Powers, 220 E. 42nd St., New York, in New York City and northern New Jersey; R. V. Pettingell, 2 Rangeley Ridge, Winchester, Mass., in Massachusetts; H. A. Ledig, 3617 N. Broad St., Philadelphia, Pa., in Pennsylvania, east of Harrisburg, and New Jersey, south of Trenton; S. Gillen Hyman, 90 Maitland St., Toronto, Can., in Ontario.

Clemson Brothers Introduce New Back Band Saw

Clemson Brothers, Inc., Middletown, N. Y., after 47 years of manufacturing Star hack saw blades exclusively, introduced during the past month to the metal cutting industry the new Star flexible back band saw. The Clemson organization has been connected with the manufacture of saws for almost a century.

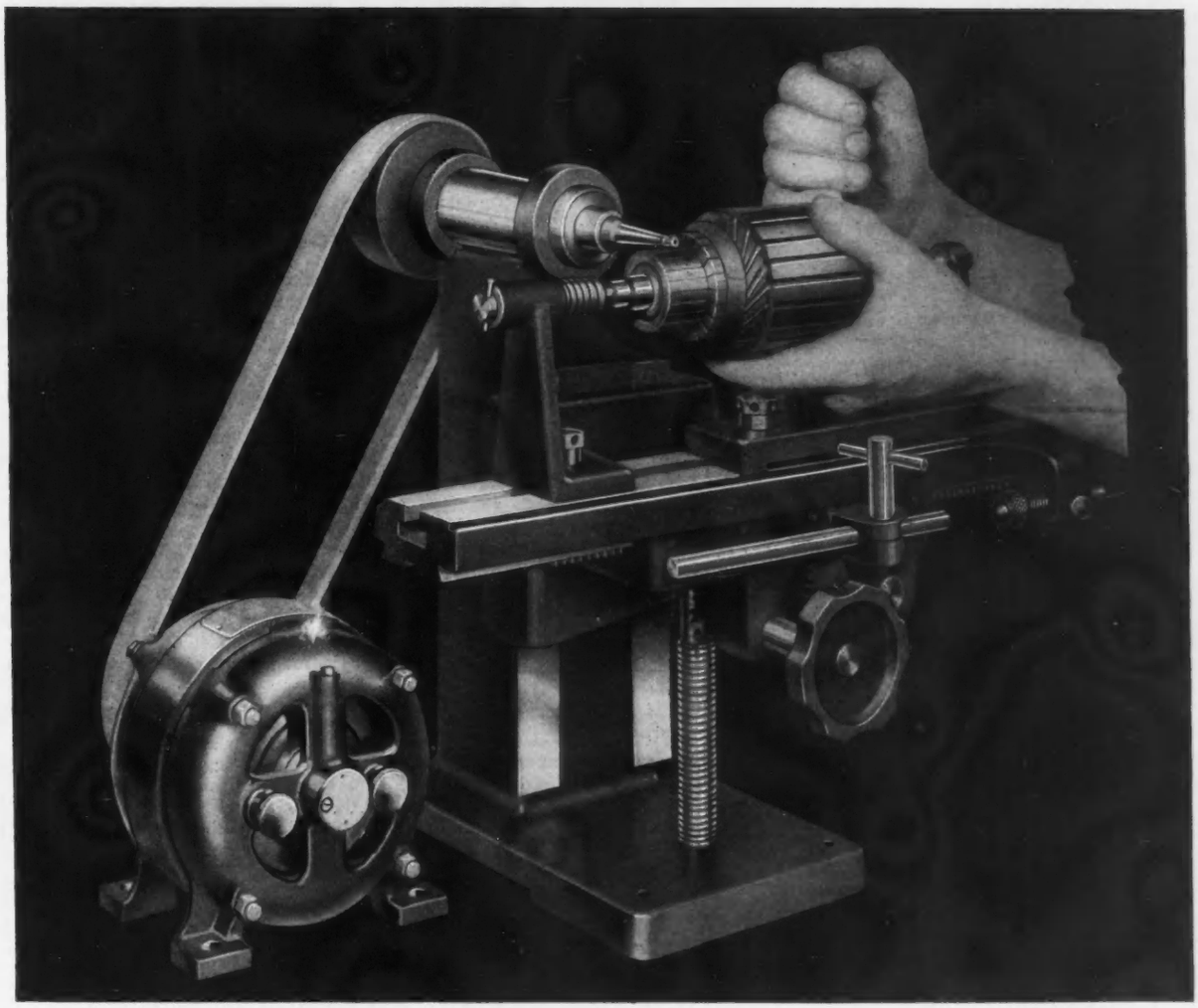
Burke Controller Purchased by Ward Leonard

Negotiations have been completed for the sale of Burke Controller Corporation, 369 Lexington Ave., New York to the Ward-Leonard Company, Mt. Vernon, N. Y. Ward-Leonard will add to its line of resistors, rheostats, motor starters and battery charging equipment the line of electric relays, circuit breakers and control equipment formerly manufactured by the Burke corporation.

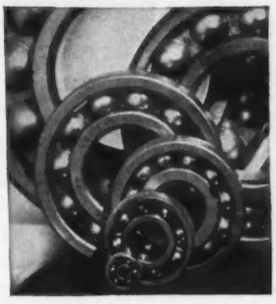
Brevities

Burkaw-Incorporated, 30 Court St., Newark, N. J., is the name of the new company organized to manufacture the products of A. W. Burke, former chief engineer of the Burke Controller Corporation, 369 Lexington Ave., New York. Burke relays, circuit breakers and other electrical equipment will be made. Associated with the new company is the sales and engineering per-

NEW DEPARTURE BALL BEARINGS



Work them to the limit!



When you buy a machine that is equipped with New Departures, you can work it to the limit. To give utmost performance, The Hullhorst Micro Tool Company uses New Departures in the spindle of its heavy duty mica undercutter. Operating at high speeds the cut is smooth, accurate. No chatter, heating or other bearing troubles. Electric motor makers and buyers recognize the sterling qualities of New Departures, too . . . if a tremendously increasing demand is a reliable indication. They perform with equal facility in any position from horizontal to vertical . . . and with all types of drives. The New Departure Mfg. Co., Bristol, Conn.; Detroit, Chicago, San Francisco.

Nothing rolls o o o o o o like a ball

sonnel of the Burke Controller Corporation.

Zenith Radio Corporation, Chicago, has appointed Arthur T. Haugh as sales manager of domestic and foreign sales. Mr. Haugh is a member of the board of directors of the Radio Manufacturers Association and a former president of the association.

United States Electrical Manufacturing Company, 200 E. Slawson Ave., Los Angeles, Cal., manufacturer of asbestos-protected AutoStart motors, is enlarging factory headquarters for the third time in 12 months. Approximately 25 per cent more area is being added.

Philadelphia Storage Battery Company, Ontario and C Sts., Philadelphia, Pa., has announced its decision to manufacture its own radio tubes which will soon be available through regular Philco dealers.

Lincoln Electric Company, Coit Rd. and Kirby Ave., Cleveland, Ohio, has advanced Harold F. Kneen to the position of plant superintendent. He was formerly assistant plant superintendent. C. J. Bowers has been appointed production manager of the Cleveland plant.

Fredericks Armature Corporation has moved its general offices and Chicago factory to a new building at 1315-1325 S. Wabash Ave., Chicago.

De Vilbiss Company, 3750 Detroit Ave., Toledo, Ohio, manufacturer of spraying outfits, has taken over the Williams Spray Equipment Company, 4007 Vermaas Ave., Toledo.

American Enameled Magnetic Wire Company, subsidiary of Electric Auto-Lite Company, is moving its factory and 300 workers from Muskegon, Mich., to Port Huron, Mich.

Bryant Electric Company, Bridgeport, Conn., has appointed William J. Weaver general sales manager to succeed Robert M. Eames, who was recently appointed general manager of the company.

Crocker-Wheeler Electric Manufacturing Company, Ampere, N. J., at its recent annual meeting, elected M. Hartley Dodge and Herbert C. Petty directors. Other directors were reelected.

Rawlplug Company, formerly located at 66 West Broadway, New York, has moved to new quarters at 98 Lafayette st.

Ilsco Copper Tube & Products, Inc., is the new name of the former Incandescent Light & Stove Company, Madisonville Station, Cincinnati, Ohio.

Grigsby-Grunow Company, Chicago, has awarded the contract for a new $100,000 plant to be located at 5801 Dickens Ave., Chicago. It will be devoted to the manufacture of refrigerators.

Ward Manufacturing Company, makers of soldering irons, has moved factory and office from 937-39 Wellington Ave., Chicago, to new quarters at 1161 Milton Ave., Chicago.

S. R. Fralick & Company, formerly located at 15 South Clinton St., Chicago, is now in new quarters at 564 West Monroe St., Chicago.

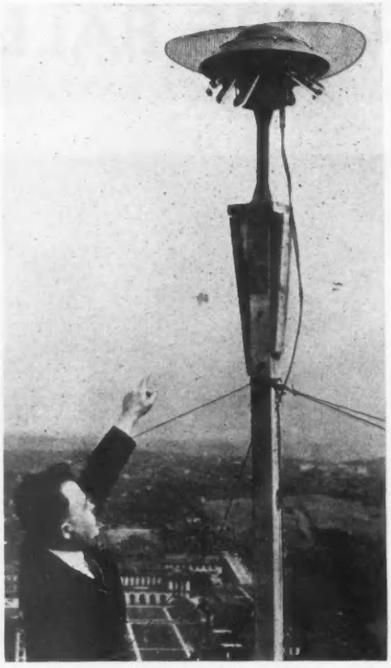
U. S. Radio & Television Company, formerly located at Chicago, Ill., has moved to Marion, Ind.

DeForest Radio Company, Passaic, N. J., has appointed Charles A. Rice, former sales manager for the Champion Radio Works, Inc., as Eastern sales manageer.

American Circular Loom Company, Inc., moved on May 1 to new quarters in the Woolworth Building, 233 Broadway, New York. This firm, which manufactures wiring materials, was formerly located at 90 West St., New York.

Armstrong Electric & Manufacturing Corporation, 370 Lexington Ave., New York, has elected C. M. Bunnell as vice-president in charge of sales. Mr. Bunnell for the past year has been general sales manager of the company, and prior to that had been connected with the Pyrene Manufacturing Company, Newark, N. J., in the same capacity.

New Neon Air Light



TALL, unlighted structures will be protected from low flying aircraft by this "obstruction marker" (above) which Westinghouse Elec. & Mfg. Co. has erected in Pittsburgh, 40 stories high

Branch Offices and Agencies

National Carbon Company, Cleveland, Ohio, has moved its Western Division headquarters office to its new building at 910-912 Baltimore Ave., Kansas City.

National-Harris Wire Company, 195 Verona Ave., Newark, N. J., has appointed J. Raymond Hanna, 135 Spring St., Rochester, N. Y., as representative in New York State territory from Buffalo to Albany and from Elmira to Watertown.

Bunting Brass & Bronze Company, Toledo, Ohio, has relocated its Chicago branch sales office and warehouse at 1221 W. Washington Blvd., from quarters on S. Michigan Ave.

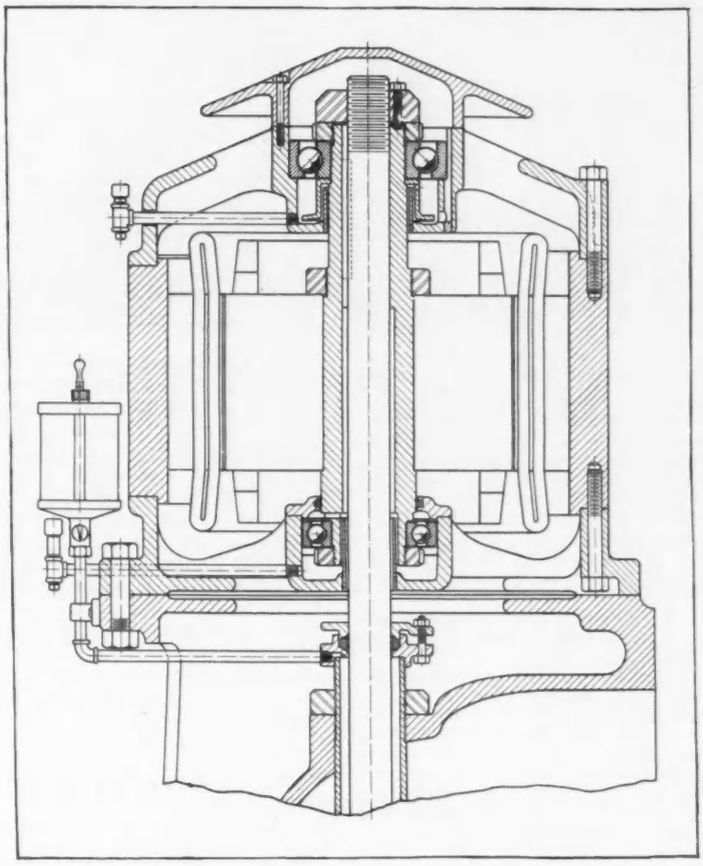
Friedman-Snyder Company, manu-

A firm in Calcutta, India, is interested in securing an American agency for flash lights and flash light batteries. Interested companies may submit their catalogs and prices through the Bureau of Foreign and Domestic Commerce, Electrical Equipment Division, Washington, D. C.

Opening the Way for More Excuses

NIGHT golf is fast becoming a new hobby among rabid link fans. Above is pictured a typical night scene on an 18-hole miniature course in Los Angeles. Illumination is provided by 18 Crouse-Hinds floodlights of 500 watts each. The problem now is to keep all those "over 100" experts from staying out all night

GURNEY RADIO-THRUST BALL BEARINGS---



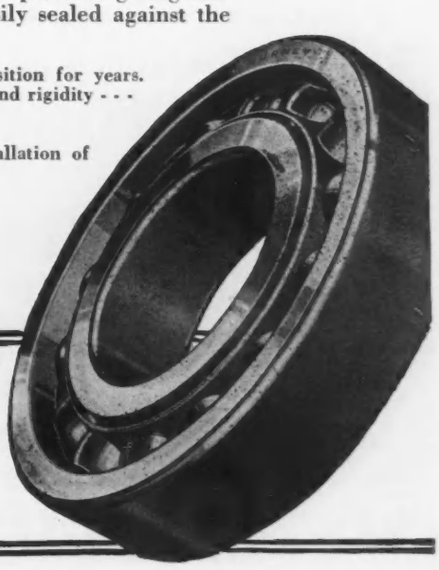
Give Years of Trouble-free Service in Vertical Electric Motors

The rotor support bearing of a vertical electric motor is one of the most severe of all electric motor bearing positions. This bearing supports the full weight of the armature and therefore must have exceptional thrust capacity. It must be capable of giving continual service without signs of wear. It must be compact and easily sealed against the intrusion of dirt, corrosion and other deteriorants.

The Gurney radio thrust ball bearing has been serving in this exacting position for years. It possesses extraordinary thrust capacity - - - maintains its original precision and rigidity - - - performs faultlessly with neither wear nor adjustment.

Gurney engineers will be pleased to furnish special information on the installation of ball bearings to all types of electric motors.

THE GURNEY BALL BEARING DIVISION
MARLIN-ROCKWELL CORPORATION
JAMESTOWN, N. Y.



GURNEY
BALL BEARINGS

facturers' representatives, have moved from 15 Park Place, New York, to larger quarters at 205 E. Forty-second St., New York.

Manufacturers' Literature

ELECTRICAL MANUFACTURING *presents a digest of recently issued catalogs, bulletins and other advertising material. Manufacturers are invited to send literature for review in this column.*

Eisler Electric Corporation, 744-772 S. Thirteenth St., Newark, N. J. Catalog "C" containing 130 pages devoted to the description and illustration of Eisler electric machinery for the manufacture of radio tubes, television tubes, Neon sign tubes, incandescent lamps and glass products. Over 700 illustrations.

Ajax Electrothermic Corporation, Trenton, N. J., offers Bulletin No. 6 describing Ajax-Northrup motor-generator type furnaces and equipment, the principle of operation and field of application.

States Company, Hartford, Conn. New catalog sections as follows: Section 2, descriptive of States phase shifters; section 3, supplementing States Form "S" test tables; Section 5, States ohm spun loads; Section 9B, States Type "SJ" test blocks.

Fairbanks, Morse & Company, 900 S. Wabash Ave., Chicago, Ill. A booklet celebrating the beginning of the second century of this business. With many illustrations it reviews the progress of the company from 1830 to 1930, and the industrial periods through which the business passed.

Polymet Manufacturing Corporation, 829 E. 134th St., New York. Engineering manual. containing descriptive matter pertaining to paper and mica condensers, resistors, coils, volume controls, magnet wire and similar parts.

Nolu Oilless Bearing Company, 6 E. Johnson St., Germantown, Philadelphia, Pa. Price list of Nolu plain cylindrical bushings, thrust washers and oilless bearings, together with instructions for installing Nolu bearings.

Wadsworth Electric Manufacturing Company, Inc., Covington, Ky. Bulletin No. 43 describing and illustrating the Wadsworth flush type branch circuit cabinets for toggle switches.

Struthers Dunn, Inc., Philadelphia. A 19 pp. catalog on relays. Contains many diagrams and halftone illustrations as well as complete specification data.

For the Man Who Keeps Your Lists

Because the following manufacturers are now either out of business or have discontinued making an electrical product, we have removed their names from our lists:

Sol Electric Steam Heater Co., 1601 Dexter Ave., Seattle, Wash.

Universal Hot Bar Co., 218 E. 59th St., New York, N. Y.

R. & S. Lighting Fixture Corp., 193 Mercer St., Brooklyn, N. Y.

Universal Electric Sign Co., 191 Lembeck Ave., Jersey City, N. J.

Firm Name or Address Changes:

Brown & Caine, Inc., 2317 Calumet Ave., Chicago, Ill. Name changed to Tung-Sol Condensers, Inc.

B. F. Perkins & Son, Inc., Chicopee W., Holyoke, Mass. Address changed to Williamsett, Mass.

Howard Mfg. Co., 306 S. Wabash Ave., Chicago, Ill. Name and address changed to Howard Radio Co., South Haven, Mich.

Rogers & Co., F. L., 25 S. Jefferson St., Chicago, Ill. Name and address changed to DeWalt Co., Leola, Pa.

The following manufacturers have been added to our lists either because they are new concerns or old companies which are now making some electrical product:

Motorless D. C. Neon Sign Co., 100 E. 123rd St., New York, N. Y.

Gardner Machine Co., Beloit, Wis.

Con-Tro-Lite Co., Knoxville, Tenn.

Dresden Art Works, Inc., 732 Reedsdale St., Pittsburgh, Pa.

Kintzing Loom Mfg. Co., Hanover, Pa.

Pierman, Frank, Ottawa, Ohio.

Morgan Electric Mfg. Co., 10 Hygeia St., Worcester, Mass.

Monark Battery, Inc., 119 N. Peoria St., Chicago, Ill.

Electrical Machinery Service Co., 1447 E. Anaheim St., Wilmington, Del.

In our last issue it was erroneously reported that Wagner Electric Corp., 6400 Plymouth Ave., St. Louis, had moved to 1935 Indiana Ave., St. Louis. The latter address is that of the company's Chicago office. There is no change in the St. Louis address.

Obituary

John L. Wuertz, chief engineer of the Ken-Rad Corporation, Owensboro, Ky., lost his life by drowning in the Ohio River near Owensboro, May 15. Mr. Wuertz had been connected with the Ken-Rad Corporation for over three years, having come to that organization from the Westinghouse Company.

Fred T. Jones, general manager of the Johns-Manville Corporation, died at Cleveland, May 8, at the age of 61. Formerly a banker in Delaware and Columbus, Ohio, Mr. Jones some years ago became treasurer of the Cleveland branch of the Johns-Manville Corporation.

Information Wanted

We have been asked for the names and addresses of manufacturers of the articles listed herewith.

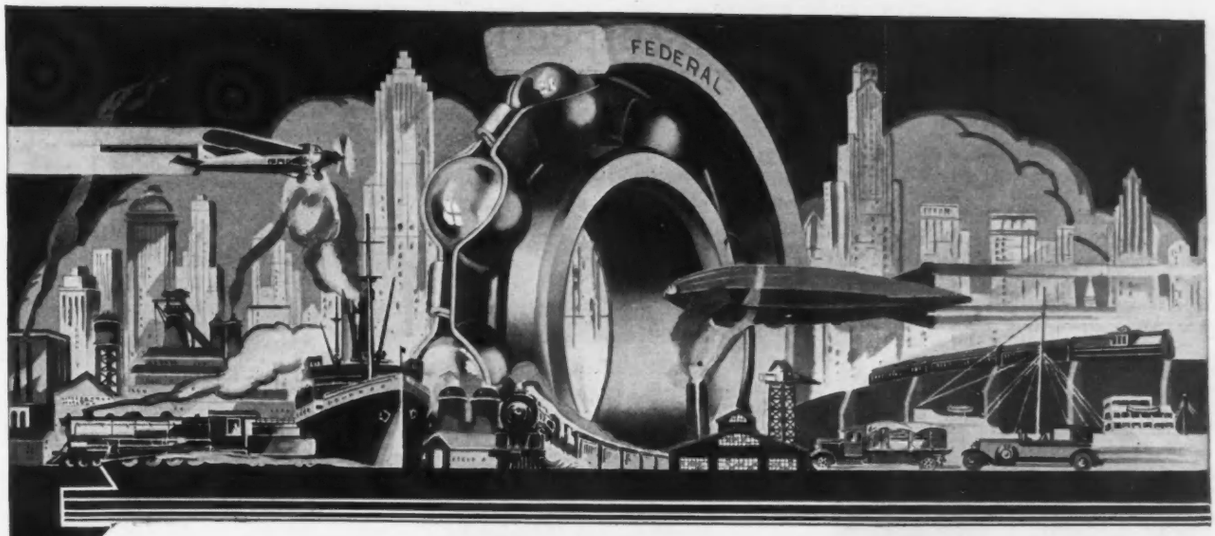
Replies from our readers to any of these inquiries will be greatly appreciated by the Information Bureau of ELECTRICAL MANUFACTURING, 461 Eighth Ave., New York City.

"L R Co" Receptacles.
"Aspinall" Soldering Fluid.
"Burrows" Therapeutic Lamp.
"Williams" Commutator Dressing.
"Flint" Waffle Iron.
"Defiance" Cigarette Lighter.
"Pioneer" House Pumps.
"Inlulet" Fittings.
"Thermodyne" Therapeutic Lamp.
"Autochauffe" Heater for Bakery Ovens.
"Wilson" Box Supports.
"Raylite" Automobile Lamp Bulbs.
"Waverly" Test Clip.
"Hillcrest" Lighting Fixtures asked for in our April issue were originally manufactured by Domestic Chandelier Company. This concern was taken over by Puritan Lighting Fixture Company, 299 Wallabout St., Brooklyn, N. Y.

"Waverly" Test Clip, asked for in our May issue, is manufactured by Waverly Musical Products Co., 1011-46th Ave., Long Island City, N. Y.

Flying High in the Fixture Field

ALADDIN MANUFACTURING COMPANY, Muncie, Ind., has fitted up a new 4-place cabin Stinson airplane as a modern fixture showroom, replete with sample portable lamps of all kinds. O. Sacksteder, general manager of the company, recently embarked with Mrs. Sacksteder on a coast-to-coast air tour in the new showroom



ENGINEERS IN ALL INDUSTRIES DEPEND UPON FEDERALS FOR PERFORMANCE AND ECONOMY

Manufacturers who take pride in their product know the importance of *reliable* ball bearings. In all industries where bearing efficiency is desired FEDERAL BEARINGS are chosen.

FEDERAL BEARINGS are notable for their quality. They are made of the finest high carbon chrome steels, and finished with exact precision. Each bearing is individually tested and inspected and backed by years of technical knowledge, and experience. That is why "FEDERALS" are used in preference to ordinary bearings.

THE FEDERAL BEARINGS COMPANY, Inc.
POUGHKEEPSIE, N. Y.

Detroit Sales Office: *917 Book Building*

FEDERAL
RADIAL BALL BEARINGS

New Goods for Your Inspection

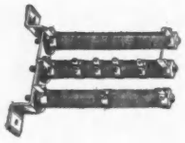
Photolytic Cell

Arcturus Radio Tube Co., Newark, N. J., announces its Photolytic cell, a photo-electric cell for all kinds of relay operations actuated by light. The application of photo-electric cell is so versatile that it can only be said that wherever there is light, either visible or invisible, there exists an application for these cells. The response of this Photolytic cell to

varying intensities of light varies according to a straight line relationship from 0 to .14 lumens. The cell is said to be extremely sensitive to minute increments of light of small intensity. Performance curves also show that maximum dynamic performance is obtained with about .5 of a lumen of light. This cell responds with a high degree of fidelity to all frequencies within the audio band. There is said to be no dark or direct current flow in the circuit applying this tube. Under a modulated light of 21-ft. candles applied for 1000 hours of uninterrupted exposure this cell was found to have depreciated less than 10 per cent in sensitivity. So rugged is the physical design and construction of this cell that it will withstand all physical abuse encountered in service without upsetting its characteristics. A heavy Bakelite housing, a heavy photo-sensitive element, a rigid negative electrode, and a heavy lens make the cell durable. This cell is said to be non-microphonic.

Truvolt Resistance Banks

Electrad, Inc., 173 Varick St., New York, offers two Truvolt air-cooled resistance banks which are said to be almost



universal in their application. One of these banks consists of three Type C units mounted on an insulated bracket. It is designed specifically as a voltage divider for any 250 or 210 amplifier or plate supply device.

A number of easily adjustable taps provide all voltages required. There are eight resistance sections, with a total resistance of 21,000 ohms. The second bank utilizes two type C units, and is meant for use with any receiver or amplifier using 245 type tubes. It is provided with adjustable taps and has seven resistance sections, with a total of 14,700 ohms.

Asbestos Paper

C. H. Dexter & Sons, Inc., Windsor Locks, Conn., is producing an asbestos paper for insulating purposes which contains no cotton fibers. It can be had in any desired thickness and in paper stock sizes. The material is intended primarily for such applications as require an insulation that is capable of withstanding high degrees of heat and where high dielectric strength and long life are essential.

Revolution Counter

Meissner Mfg. Co., 522 S. Clinton St., Chicago, offers a revolution counter for use with coil winding machines. This counter counts from 0 to 10,000 or from 10 to 100,000 revolutions. It can be equipped with a solenoid and mercury

switch mechanism to release a brake which stops the coil winding machine instantly. The counter can be set for any required number of turns and when the coil is wound to that number of turns the revolution counter stops the coil winding machine. The large size six-in. dial is readily visible. The shaft operates on ball bearings and worm and spiral gears to prevent slipping.

Armite Insulation

Spaulding Fibre Co., Inc., Tonawanda, N. Y., has introduced an insulating material known as Armite. This is a thin insulating material similar to fish paper, and is used similarly. Its diaelectric strength averages 500 volts per mill thickness, and is said to be uniform. Mullen strength tests show strengths exceeding 20 points per mill in thickness. Armite is said to have excellent forming qualities.

Line Starter and Safety Switch

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., is marketing a class 11-200-HD combination line starter and safety switch in which a novel feature is the

provision for inserting, while the motor is in operation and while the door on the cabinet is closed, a plug-type meter test jack to determine the load on the machine.

The equipment can be used without fuses, as jumpers are supplied for use when the fuses are eliminated. The safety switch has quick-break contacts and the handle is interlocked with the cover, thus preventing the opening of the door when the contacts are closed.

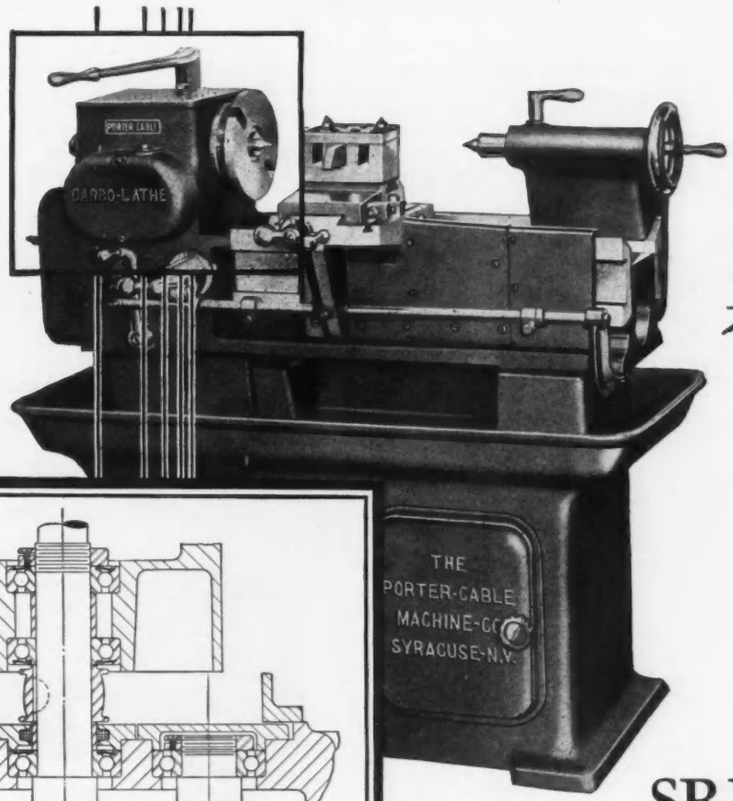
Combination Tape

Dexter Rubber Corp., 2 W. 45th St., New York, is marketing a combination tape known to the industry as Twin Tape. It consists essentially of specially made 3.60 cotton fabric and this is impregnated with three layers of friction and rubber compounds, giving the material a high dielectric strength. It is said to be weatherproof and waterproof. It is economical in use, as both friction tape and rubber tape are applied in one operation and is regularly supplied in slate color, in standard widths, in two and four-ounce rolls. Special sizes and colors are made to order.

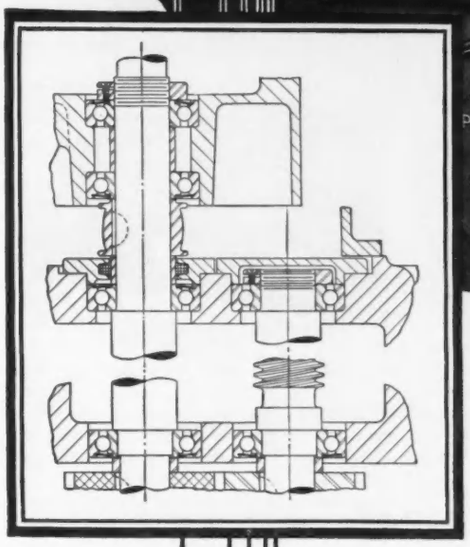
Tube Checker

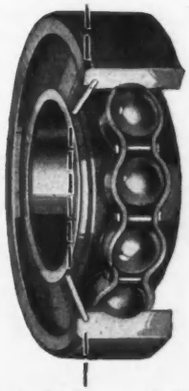
Jewel Electrical Instrument Co., 1650 Walnut St., Chicago, offers a tube checker

of simplified design that operates on 50-60 cycle, 110-220 volt A. C. without batteries. This instrument, known as Pattern



Another SRB Installation!





SRB *Lubri-Seal* Ball Bearings Increase Efficiency *of* Porter-Cable Carbo-Lathes

THIS highly efficient machine tool is equipped with sixteen SRB Ball Bearings at vital points.

As in many other industrial applications, SRB Lubri-Seal Ball Bearings are used to exclude dirt and chips from the bearing housings. The lubricant is retained for indefinite periods, thus reducing maintenance costs and insuring years of uninterrupted and care-free service.

"Lubri-Seal" your own product for greater efficiency and improved bearing performance.

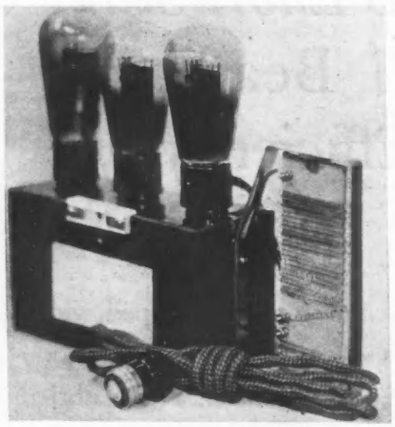
STANDARD STEEL AND BEARINGS INCORPORATED
Plainville DIVISION OF MARLIN-ROCKWELL CORPORATION *Connecticut*

Ball SRB Bearings

209, consists of a Jewell Pattern 88 D. C. meter with six tube sockets, in a case of molded bakelite. The sockets provide filament voltages of 1.5, 2.5, 3.3, 5, and 7.5 to four-prong sockets, and 2.5 to five-prong sockets. Two terminals giving 3 volts are provided for tubes that have heater terminals on top. A jack and suitable lead are provided for a grid control connection. The meter used with this instrument has a 50 division scale 2-5/16 in. long, and is calibrated to two ranges of 10 and 50 milliamperes full scale. The 10 milliamperes range is read by a push button switch, which does not add series resistance, but accurately calibrates the instrument to the scale. Filament voltages are obtained from a full size transformer, with turns accurately adjusted so that at 115 volts input the various filament values are exactly as marked. The wire is designed to carry the heavy filament currents without heating. A vitrified porcelain resistor is supplied in the circuit large enough to prevent damage in most cases of short circuited tubes, but of low enough value to avoid affecting the readings.

Direct Current High Voltage Transformer

Motorless D. C. Neon Sign Co., 100 E. 123rd St., New York, announces a direct current high voltage transformer for luminous tube operation, with the use of



which it is now possible to operate standard luminous tubes, such as the Neon, Mercury-vapor, etc., directly from 110-120 volt D. C. lines in the same manner as has heretofore been possible only with A. C. supply. The device has no moving or operating parts.

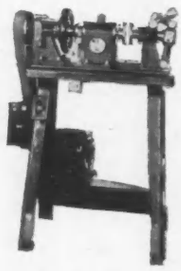
Motor Starting Ammeter

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., is manufacturing a type PY-5 motor starting ammeter for measuring the starting current of A.C. and D.C. motors. The instrument can also be used as an ordinary ammeter. Such measurements as starting current, locked rotor current and running current are made without disconnecting the instrument from the line. The instrument has a double range and change over from one range to the other is accomplished by a switch on the side of the case.

The ammeter is direct reading and is also suitable for general testing and laboratory work, where accuracy is essential. This device is mounted in a Micarta case with walnut finish and nickel trimmings. It consists essentially of a moving iron vane mechanism with an air chamber for damping the oscillations of the pointer.

Winding Machine

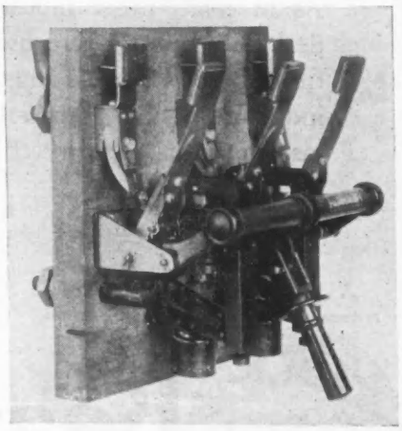
E. R. Seifert, Syracuse, N. Y., is manufacturing a winding machine which is quickly adjustable for a wide variety of coils. This machine winds coils of any number of turns and may be set to stop



automatically when the coil is completed. Coils of light or heavy wire may be wound at any desired speed. All working parts are heavy to insure rigidity and perfect alignment of the winding spindle. The machine is equipped with a quick-acting chuck which slides on parallels for varying the center distance. Ball bearings are used throughout, and the spindle is free to turn by hand when the machine is stopped. This machine may be obtained either with pedestal mounting or for mounting on a bench.

Trip-Free Air Circuit Breakers

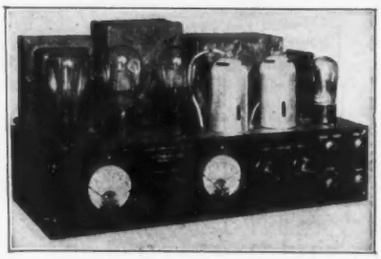
General Electric Co., Schenectady, N. Y., announces a line of trip-free air circuit breakers available for either instantaneous or time delay automatic operation in either single, double or triple pole combinations with necessary accessories. The principal advantages of these breakers are—they are



trip-free from the handle on overcurrent; there is triple contact; there is no burning on the main brush; the burning tips are easily replaced; the high pressure main contact is formed of laminations which make "end-on" contact with heavy and uniform pressure and yet is closed easily with a wiping motion and they have low operating temperature. These breakers are said to be particularly applicable on building equipment switchboards. There are three classifications of breakers for voltages of 650 volts and below; type CN-1 is a compact breaker applicable to industrial service and for circuits in buildings where the current is from 3 to 300 amperes. Type CP-108 is a breaker for moderate duty service rated 1200 amperes and below. Type CK-8 is a heavy-current breaker for moderate or heavy duty service ranging from 1600 amperes up.

Resistance Coupled Amplifier Units

Stevens Mfg. Corp., Newark, N. J., has developed a line of resistance-coupled amplifiers ranging from a three-tube chassis with single 45 type power tube to the



most elaborate unit with two 45 type power tubes in push-pull, preceded by two screen-grid tubes and a single three-element tube, including meters and controls if desired. The units are compactly designed with self-contained power pack for ready incorporation in any radio set console or cabinet.

Water Heater Clock

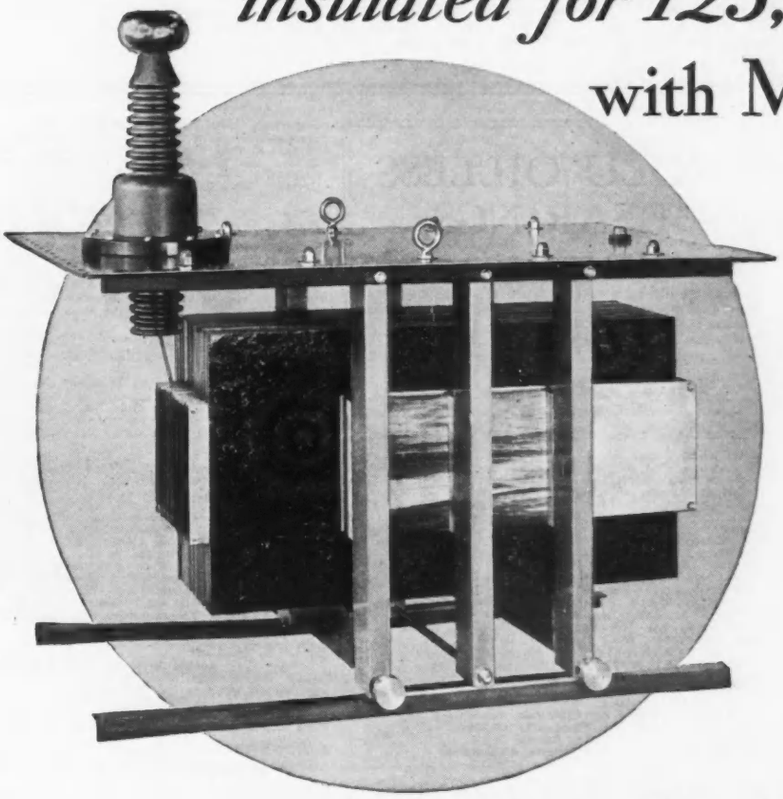
Clark Electric Water Heater Division McGraw Electric Co., Omaha, Neb., announces a timer control clock used for in-

termittent service of electric water heaters. This device permits of continuous automatic operation, if the pointer is turned to the space on the dial marked constant contact. It also provides ordinary automatic service over a period of one hour.

Kelley-Koett condenser

insulated for 125,000 Volts

with MICANITE



PULSATING D. C. with a peak of 250,000 volts, is spanned by two .02 Mfd. condensers in series. Micanite plate 1/4" thick is the dielectric that helps to deliver smooth unvarying current to the load.

Oil, in which this condenser is submerged, and the high potentials to which it is subjected, have no detrimental effects on the Micanite. High dielectric strength is lasting.

Whether it be for a condenser, a motor, a generator, or any other electrical unit that requires built-up mica insulation, you will find a form of Micanite ideal for the purpose. Catalog 87 describes the characteristics of various forms. Write for a copy.

MICA INSULATOR COMPANY

New York: 200 Varick St. Chicago: 542 So. Dearborn St.

Cleveland Pittsburgh Cincinnati Birmingham Seattle San Francisco
Los Angeles Toronto Montreal *Works:* Schenectady, N. Y. London, Eng.

PERFECT MICANITE INSULATOR REG. U.S. PAT. OFF.

Electrical INSULATION

PERFECT EMPIRE INSULATOR REG. U.S. PAT. OFF

MICA INSULATION OILED CLOTH INSULATION

Index of Raw Materials, Parts, Electrical Equipment

For all electrical products including electrically operated machines and appliances

Trade Names—Manufacturers' Names—Local Addresses

The names of all manufacturers are grouped alphabetically under the heading for the product they manufacture. Trade names also appear in alphabetical position under the subject identifying the product. Thus "Linolac" insulating varnish will be found in alphabetical position under the heading "Paint, Varnish, Lacquer."

Note: The Classified Index of ELECTRICAL MANUFACTURING is limited to those subjects of interest to the specific field which it covers, for obvious reasons. A complete Classified Index of all electrical commodities bought, sold, or used by Electrical Supply Jobbers, Contractors, Dealers, Central Stations and other electrical industry outlets appears regularly in each issue of ELECTRICAL RECORD as heretofore.

ALLOYS, LIGHT METAL
Bohn Aluminum & Brass Corp., 2512 E. Grand Blvd., Detroit, Mich.
Bohnalite. See Bohn Aluminum & Brass Corp.

ALUMINUM
(Also Aluminum Bronze Powder.)
Albron, Alcoa Alumac. See Aluminum Co. of America.
Aluminum Co. of America, 2444 Oliver Bldg., Pittsburgh.
Fairmont Aluminum Co., Fairmont, W. Va.

AMMETERS. See Instruments.

ARMATURE
Balancers. See Balancers, Armature.
Banding Machines. See Banding Machines, Armature
Bearings. See Bearings.
Buggies. See Lifts, Armature.
Coil Presses. See Presses, Armature Coil.
Coils. See Coils, Finished.
Core Punchings. See Discs, Armature.
Cranes. See Lifts, Armature.
Discs. See Discs, Armature.
Driers. See Ovens.
Growlers. See Testers, Coil.
Hoists. See Lifts, Armature.
Impregnators, Vacuum. See Ovens, Industrial.
Jacks. See Lifts, Armature.
Laminations. See Discs, Armature.
Lathes. See Lathes.
Lifts. See Lifts, Armature.
New. See Coils, Finished.
Notching Machines. See Notching Machines, Armature.
Pegs. See Pegs, Armature.
Pinion Pullers. See Pullers, Armature Shaft.
Repaired. See Repairing and Second-Hand.
Shaft Pullers. See Pullers, Armature Shaft.
Shaft Straighteners. See Straighteners, Armature Shaft.
Stands. See Stands, Armature.
Test Benches. See Test Benches, Armature.
Testers. See Testers, Coil; also Test Benches, Armature.
Torpedo Cord. See Twine, Armature Winding.
Trouble Shooters. See Testers, Coil; also Test Benches, Armature.
Trucks. See Lifts, Armature.
Wedges. See Pegs, Armature.
Winding Machines. See Winding Machines, Armature & Field Coil.
Winding Twine. See Twine, Armature.

ARMATURE & COIL SPRAY GUNS. See Spraying Outfits.

ARMORING MACHINES. See Wire Manufacturing Machines.

ARMS, FLEXIBLE. See Tubing Flexible Metallic.

ASBESTOS Shades. See Shades, Fabric.
Paper & Sheet. See Asbestos.
Slabs. See Asbestos Slabs.
Tape. See Tape, Asbestos.
Wire. See Wire, Insulated.
Yarn and Thread. See Yarn and Thread.

ASBESTOS
Sheet, Paper, Mill Board, Lumber.
Ambler Asbestos Shingle & Sheathing Co., Ambler, Pa.
Easco. See Eastern Asbestos Co.
Eastern Asbestos Co., Providence, R. I.
Ferodo & Asbestos, Inc., New Brunswick, N. J.
Johns-Manville Corp., New York, N. Y.

ASBESTOS SLABS
Slabs & Barriers for Switchboard.
Asbestos-Ebony. See Johns-Manville, Inc.
Ambler Asbestos Shingle & Sheathing Co., Ambler, Pa.
Deceleco, Inc., Wayne, Mich.
Electrobestos. See Johns-Manville Corp.
Ferodo & Asbestos, Inc., New Brunswick, N. J.
Johns-Manville Corp., New York, N. Y.
Transite. See Johns-Manville, Inc.
Zellite. See Deceleco, Inc.

BAGS, Vacuum Cleaner
Merrimack Mfg. Co., Boston, Mass.

BAKELITE MOULDS. See Dies, Die Makers.

BALANCERS, Armature
(Dynamic Balancing Machines—Balancing Ways).
Anderson Bros. Mfg. Co., Rockford, Ill. (Ways).
Armature Coil Equip. Co., 2415 Forestdale Ave., Cleveland, O. (Machine).
Bowsher Co., N. P., South Bend, Ind.
Olsen Lundgren. See Olsen Testing Machine Co.
Olsen Testing Machine Co., Tinius, 500 N. 12th St., Philadelphia, Pa. (Machines)
Sundstrand Machine Tool Co., Rockford, Ill.
Twentieth Century. See Sundstrand Machine Tool Co.
Vibration Specialty Co., 1534 Winter, Philadelphia, Pa (Machines).

BALL BEARINGS. See Bearings, Ball and Roller.

BANDING MACHINES, Armature
Columbia Machine Wks. & Malleable Iron Co., Atlantic Ave. & Chestnut St., Brooklyn, N. Y.
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
Peerless. See Electric Service Supplies Co.
Ridlon Company, Frank, Boston, Mass.

BARRIERS, Switchboard. See Slate; also Soapstone; also Asbestos.

BARS, BUS. See Brass, Bronze & Copper; also Aluminum.

BARS, Commutator
Anaconda. See American Brass Co.
American Brass Co., Waterbury, Conn.
Buckeye Tempered Copper & Brass Co., Mansfield, O.
Cameron Electric Mfg. Co., Ansonia, Conn.
Commutator Co., 121 N. Front, Minneapolis, Minn.
Electric Materials Co., North East, Pa.
Eureka Metal Products Corp., 2210 Elmwood Ave., Buffalo, N. Y.
Homer Commutator Co., 4748 Hough Ave., Cleveland.
Rome Brass & Copper Co., Div. of Revere Copper & Brass, Inc., Rome, N. Y.

BASES, Radio Tube. See Radio Molded Parts.

BASES, Reading Lamp
Metal, Pottery, Wood & Glass.
American Ring Co., Waterbury, Conn.

NOLU OILLESS BEARINGS
WOOD IMPREGNATED
Adapted for high or low speed machinery. Never need oil. Increase output. Keeps materials free from soil through elimination of oil. "Thrive on Neglect." Samples on request. Write us.
NOLU OILLESS BEARING CO.
2 East Johnson St.
Germantown, Philadelphia, Pa.

Aladdin Mfg. Co., 602 E. 18th, Muncie, Ind.
Camden Art Tile & Pottery Co., Camden, Ark.
Estes & Sons, E. B., 5844 Grand Central Terminal, New
Fulper Pottery Co., Flemington, N. J.
Globe Metal Spinning Co., 178 Centre, New York, N. Y.
Hemill Products, inc., 103 Mott, New York, N. Y.
Insulation Mfg. Co., New York Ave. and Herkimer St., Brooklyn, N. Y.
Marbleart. See Insulation Mfg. Co.
Natural. See Insulation Mfg. Co.
Rodale Mfg. Co., 200 Hudson, New York, N. Y.
Sneath Glass Co., Wabash Ave., Hartford City, Ind.
Van Briggle Tile & Pottery Co., Colorado Springs, Colo.
Welker, S. A., Zanesville, O. (Pottery.)
Yokel Corp., 219 Homestead Ave., Hartford, Conn.
Zane Pottery Co., South Zanesville, O.

BATTERY CHEMICALS. See Chemicals, Battery.
BATTERY CUT OUTS. See Switches, Battery.
BATTERY GAGES. See Instruments, Pocket.
BATTERY JARS. See Jars, Battery, Glass; also Rubber; also Molded Insulation.
BATTERY OXIDES. See Chemicals, Battery.
BATTERY SALTS. See Chemicals, Battery.
BEAD CHAIN. See Chain, Socket.
BEADS. Chandelier. See Crystals, Chandelier.

BEADS, Insulating
American Lava Corp., 1425 William, Chattanooga, Tenn.
Durco. See Struthers Dunn, Inc.
Martindale Elec. Co., 1262 W. Fourth, Cleveland, O.
Struthers Dunn, Inc., 138 N. Juniper, Philadelphia, Pa.
Stupakoff Laboratories, 6627 Hamilton Ave., Pittsburgh, Pa.

BEARINGS
Ball & Roller. See Bearings, Ball & Roller.
Graphite. See Bearings, Oil-less.
Oil-less. See Bearings, Oil-less.
Sleeve. See Bearings & Bushings.

BEARINGS, Ball and Roller
Aetna Ball Bearing Mfg. Co., Chicago, Ill.
Ahlberg Bearing Co., 312 E. 29th, Chicago, Ill.
American Roller Bearing Co., Pittsburgh, Pa.
Auburn Ball Bearings Co., 83 Clarissa, Rochester, N. Y.
Ball & Roller Bearing Co., Danbury, Conn.
Bantam Ball Bearing Co., South Bend, Ind.
Bearings Co. of America, Lancaster, Pa.
Commercial. See Schatz Mfg. Co.
C J B. See Ahlberg Bearing Co.
Fafnir Bearing Co., New Britain, Conn.
Federal Bearing Co., Poughkeepsie, N. Y.
Gurney. See Marlin-Rockwell Corp.
Gwilliam Co., 360 Furman, Brooklyn, N. Y.
Hoffman. See Norma-Hoffman Bearings Corp.
Hoover Steel Ball Co., Ann Arbor, Mich.
Hyatt Roller Bearing Div. of General Motors Corp., Harrison, N. J.
McGill Metal Co., Valparaiso, Ind.
Marlin-Rockwell Corp., Gurney Ball Bearing Div., Jamestown, N. Y.
Mathews Mfg. Co., 104 Gold, Worcester, Mass.
New Departure Mfg. Co., Bristol, Conn.
Nice Ball Bearing Co. (Nicetown), Philadelphia, Pa.
Norma-Hoffman Bearings Corp., Stamford, Conn.
Roller Bearing Co of America, Whitehead Rd., Trenton.
Rollway Bearing Co., 541 Seymour Ave., Syracuse, N. Y. (Roller)
Schatz Mfg. Co., Poughkeepsie, N. Y.
Schubert. See McGill Metal Co.
S R B. See Standard Steel & Bearings, Inc.
Standard Steel & &Bearings, Inc., Div. of Marlin-Rockwell Corp., Plainville, Conn.
Strom Bearings Co., 4587 Palmer, Chicago, Ill.
S. K. F. Industries, 40 E. 34th, New York, N. Y.
Timken Roller Bearing Co., Canton, O.
Torrington Co., Torrington, Conn
Zubler Bearings Co., 1321 W. Tioga, Philadelphia, Pa.

BEARINGS, Oil-Less
Argute Oilless Bearings Co., 149 Berkeley, Philadelphia, Pa.
B. M. C. See Burlington Metal Corp.
Bogert & Hopper, Inc., 235 Varick, New York, N. Y.
Bound Brook Oil-less Bearing Co., Bound Brook, N. J.

Ball and Socket Joint

INSULATORS
Ask for samples
STRUTHERS DUNN, INC.
134 North Juniper Street, Philadelphia, Pa.

Burlington Metal Corp., Burlington, Wis.
Cleveland Graphite Bronze Co., 889 E. 72nd, Cleveland, O
Electric Railway Equipment Co., 30 Church, New York, N. Y.
Elreco. See Electric Railway Equipment Co.
Graphalloy. See Graphite Metallizing Co.
Graphite Metallizing Co., 1050 Nepperhan Ave., Yonkers, N. Y.
Lubrite. See Merriam Bros., Yonkers, N. Y.
Merriam Bros., 185 Amory, Boston, Mass.
Metal Saw & Machine Co., Springfield, Mass.
Moraine Products Co., First & Foundry Sts., Dayton, O.
Neveroil Bearing Co., Wakefield, Mass.
Nolu Oilless Bearing Co., 2 E. Jackson, Philadelphia, Pa.
O. & S. Bearing Co., 315 S. Artillery, Detroit, Mich.
Reliance. See Metal Saw & Machine Co.
Selb Lignum-Vitae Woodturning Co., 98 Boyd Ave., Jersey City, N. J.
United States Graphite Co., Saginaw, Mich.

BEARINGS AND BUSHINGS
(For Armature Shafts.)
Adjustable Bearing Co., 101 Transportation Bldg., Indianapolis, Ind.
Ajax Metal Co., Philadelphia, Pa.
American Bronze Corp., Berwyn, Pa.
Bohn Aluminum & Brass Corp., 2512 E. Grand Blvd., Detroit, Mich.
Bunting Brass & Bronze Co., Toledo, Ohio
Cadman Mfg. Co., G. W., Pittsburgh, Pa.
Damascus Bronze Co., Pittsburgh, Pa.
Durex. See Moraine Products Co.
Erie Bronze Co., 1832 Chestnut, Erie, Pa.
Federal-Mogul Corp., Shoemaker & Lillibridge Sts., Detroit.
Flood City Mfg. Co., Johnstown, Pa.
Johnson Bronze Co., New Castle, Pa.
Lumen Bearing Co., Buffalo, N. Y.
Moraine Products Co., First & Foundry Sts., Dayton, O.
National Bearing Metal Corp. (More-Jones Brass & Metal Div.), 4930 Manchester Ave., St. Louis, Mo.
United States Graphite Co., Saginaw, Mich.

BELTING, Chain Transmission. See Chain, Power Transmission.

BELTS, Rubber
Molded Cold Rubber Belts for Electrical Appliances.
Dayton Rubber Mfg. Co., Dayton, O.
Fay Rubber Products Co., Elyria, O.
Gilmer Co., L. H., Cottman & Keystone Sts. (Tacony), Philadelphia, Pa.
Todd Elect. Co., 914 Grand Ave., Kansas City, Mo.

BENDERS, Coil Loop
Armature Coil Equipment Co., 2415 Forestdale Ave., Cleveland, Ohio
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa
Segur. See Electric Service Supplies Co.

BENDING. See Punching & Bending.
BINDING POSTS. See Posts, Binding.

BLADES, Fan
Estes & Sons, E. B., 5844 Grand Central Terminal Bldg New York, N. Y.
Reading Elec. Co., Inc., 24 Frankfort, New York, N. Y.
Torrington Mfg. Co., Torrington, Conn

BLOCKS, Terminal. See Terminal Blocks.

BLOWERS, Armature
For Dusting Out Motors.
Big Midget. See Sturtevant Co.
Breuer Elec. Mfg. Co., 852 Blackhawk, Chicago, Ill.
Clements Mfg. Co., 609 Fulton, Chicago, Ill.
Cyclone Portable Electric Blower Co., 1304 Diamond, Philadelphia, Pa.
Electric Blower Co., 352 Atlantic Ave., Boston 9, Mass.
Ideal Commutator Dresser Co., 1039 Park Ave., Sycamore, Ill.
Marvel. See Electric Blower Co.
Sanitator. See United Elec. Co.
Cadillac. See Clements Mfg. Co.
Standard Elecl. Tool Co., 1939 W. Eighth, Cincinnati, O.
Sturtevant Co., B. F. (Hyde Park), Boston, Mass.
Tornado. See Breuer Elec. Mfg. Co.
United Elec. Co., 1230 8th, Conton, O.
United States Elecl. Tool Co., 2488 W. Sixth, Cincinnati, O.

BLUESTONE. See Chemicals, Battery
BOARD, Fuller. See Cloth and Paper.
BOARD, Press. See Cloth and Paper
BOMBARDING MACHINES. See Machines, Lamp Making
BOWL HOLDERS. See Fixture Fittings
BOX & CABINET BUSHINGS. See Bushings, Box & Cabinet.

BOX BOARD
Container Corp. of America, 111 W. Washington, Chicago
Mid-West Box Co., 111 W. Washington, Chicago.

BOXES, Fibre
Container Corp. of America, 111 W. Washington, Chicago
Mid-West Box Co., 111 W. Washington, Chicago
BOXES, Sheet Steel. See Cabinets, Sheet Steel.
BOXES, Wood. See Cabinets & Boxes, Wood.

BOXES AND WRAPPERS
Brown & Bailey Co., 417 N. Eighth, Philadelphia, Pa
Bulldog. See Pittsburgh Corrugated Paper Box Co.
Campbell Paper Box Co., 904 S. Main, South Bend, Ind.
Consolidated Paper Co., Monroe, Mich.
Container Corp. of America, 111 W. Washington, Chicago
Gair Co., Robert, 430 Lexington Ave., New York. (Boxes)
Gator-Hide Kraft. See International Paper Co.
Hinde & Dauch Paper Co., 325 Decatur, Sandusky, Ohio.
Huntington Paper Box Co., Huntington, Ind.
International Paper Co., 100 E. 42nd, New York, N. Y
Lake Lithegraphing Co., 2570 Superior Ave., Cleveland, O (Display Cartons.)
Mid-West Box Co., 111 W. Washington, Dept. 36, Chicago
National Folding Box Co., New Haven, Conn. (Cartons.)
Pequot Mfg. Corp., Glendale (L. I.), New York.
Pittsburgh Corrugated Paper Box Co., Pittsburgh, Pa.

A 2 in 1 Service

to Electrical Manufacturers

The Waterbury Button Company produces both metal parts and mouldings within the one organization, insuring a constant standard of quality in both lines.

This dual service also insures economies for you.

We specialize in moulded BAKELITE, also making mouldings of Durez, Lumarith, Shellac, and other compounds. Your specifications will be exactly followed in any shape, compound, metal or finish. Every-day items such as terminals, knobs, plugs, and cord ends are always carried in stock. Also ferrules in 150 sizes and eyelets in 200 sizes in any metal or finish are stocked in large quantities ready for immediate shipment.

Send for samples of standard eyelets, terminals, or ferrules.

WATERBURY BUTTON CO.
Electrical Mfg. Dept.
Waterbury, Conn.

Gentlemen: Kindly send free sample card of Eyelets, Terminals and Ferrules.

☐ Am also interested in saving money on Moulded Parts.

Name .....

Street .....

City .....

WATERBURY BUTTON COMPANY

Established 1812

Main Office and Factories at WATERBURY, CONN., U. S. A.

PYROXYLIN LACQUERS

Accepted for every use throughout industry as the highest standard of lacquer excellence since 1884.

The facilities of our Service Laboratory equip us to work out any finishing problem and enable us to render you valuable assistance without cost.

ZAPON

THAT HOLD CUSTOMER CONFIDENCE

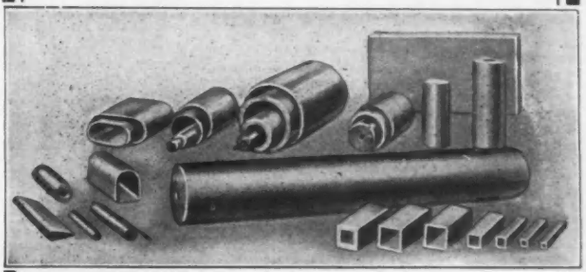
THE pioneering spirit which has lifted Zapon Pyroxylin Lacquers to their present pinnacle of leadership, made them a standard bearer of matchless uniformity, quality and economy, is consistently pledged to a policy of progress that will hold customer confidence by sheer reason of superiority.

Absolute control over basic raw materials and chemical processes give Zapon an unrivaled advantage in continuous advancement, service and leadership.

THE ZAPON COMPANY

STAMFORD
CONN.

Quick Delivery



All kinds of Insulation

Bakelite, Insuline, Hard Rubber, Ebony Asbestos Wood, Vulcanized Fibre, Transite, Fish Paper.

Sheets, rods, and tubes of all thicknesses and dimensions—furnished to manufacturers, experimenters and laboratories on short notice—24 hour service.

Furnished either in plain material or completely cut, drilled, engraved or stamped to specifications.

Complete machine shop for drilling, engraving and stamping.

No Order Too Large or Too Small

INSULINE CORP. OF AMERICA

78-80 Cortlandt St. New York, N. Y.

BOXES & WRAPPERS—Continued
River Raisin Paper Co., Monroe, Mich.
Rockford Fibre Container Co., Rockford, Ill.
Shuttleworth Carton Co., 474 W. Broadway, New York.

BRACKETS, Instrument
For Suspending Meters to Station Switchboard.
General Electric Co., Schenectady, N. Y.
Roller-Smith Co., 230 Broadway, New York, N. Y.
Trumbull Elec. Mfg. Co., Plainville, Conn.
Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.

BRAIDING MACHINES. See Wire Manufacturing Machines.

BRASS TUBING. See Tubing, Brass and Copper.

BRASS, BRONZE AND COPPER
Sheet, Rod, Bar.
Anaconda. See American Brass Co.
American Brass Co., Waterbury, Conn.
American Nickeloid Co., Peru, Ill.
Baltimore Brass Co., 1212 Wicomico, Baltimore, Md.
Baltimore Copper Mills, Div. of Revere Copper & Brass, Inc., Baltimore, Md.
Bohn Aluminum & Brass Corp., 2512 E. Grand Blvd., Detroit, Mich.
Bohnalite. See Bohn Aluminum & Brass Corp.
Bridgeport Brass Co., 774 E. Main, Bridgeport, Conn.
Buffalo Bronze Die Cast Corp., 100 Arthur, Buffalo, N. Y.
Dallas Brass & Copper Co., Div. of Revere Copper & Brass, Inc., 820 Orleans, Chicago, Ill.
Durcar. See Buffalo Bronze Die Cast Corp.
Electric Materials Co., North East, Pa.
Federal-Mogul Corp., Shoemaker & Lillibridge Sts., Detroit, Fredericksen Co., Saginaw, Mich.
Higgins Brass & Mfg. Co., Div. of Revere Copper & Brass, Inc., 12435 Dequindre, Detroit, Mich.
Johnson Bronze Co., New Castle, Pa.
Michigan Copper & Brass Co., Div. of Revere Copper & Brass, Inc., 5851 W. Jefferson Ave., Detroit, Mich.
Nickeloid. See American Nickeloid Co.
Plume & Atwood Mfg. Co., 474 Bank, Waterbury, Conn.
Scovill Mfg. Co., Waterbury, Conn.
Subera. See Fredericksen Co.
Seymour Mfg. Co., Seymour, Conn.
Taunton-New Bedford Copper Co., Div. of Revere Copper & Brass, Inc., Taunton, Mass.
Titan Metal Mfg. Co., Bellefonte, Pa. (Rods and Forgings.)
Western Cartridge Co., East Alton, Ill.

BREAKERS, Circuit. See Circuit Breakers.

BRIDGES, Wheatstone. See Instruments, Laboratory Standard.

BRONZE. See Brass, Bronze and Copper; also Castings.

BRONZE, Phosphor. See Phosphor Bronze.

BRONZE POWDER, Aluminum. See Aluminum.

BRUSH HOLDERS. See Brushes, Commutator.

BRUSHES, Carbon. See Brushes, Commutator.
Graphite. See Brushes, Commutator.
Metal Graphite. See Brushes, Commutator.

BRUSHES, COMMUTATOR
(Brushes, Brush Holders and Flexible Leads.)

Brush Holders	See H
Carbon, Graphite, Metal Graphite	See C
Flexible Leads and Pig Tails	See L
Sheet Metal	See S
Wire Gauze	See W
Automotive Mfg. Co., Kansas City, Mo.	H
B. B. B. See Becker Bros. Elec'l Corp.	
Baylis Co., Bloomfield, N. J.	H
Becker Bros Elec. Corp., 23 N. Jefferson, Chicago, Ill.	C W S H L
Blanck & Carrier Corp., 115 W. 63rd, New York, N. Y.	C
Boxill-Bruel Carbon Co., Columbia, O.	C H
Calebaugh Self-Lubricating Carbon Co., 1503 Columbia Ave., Philadelphia, Pa.	C
Carbon Engrg. Co., Slinger, Wis.	C
Carbon Laboratories Co., 5005 Euclid Ave., Cleveland, O.	C
Carbon & Graphite Corp., 227 West Broadway, New York, N. Y.	C
Carence. See Carbon Engineering Co.	
Chapin Co., Chas. E., 227 Fulton St., New York, N. Y.	C W S L
Columbia Machine Wks. & M. I. Co., 263 Chestnut, Brooklyn, N. Y.	H
Cooley Mfg. Co., 98 Park Place, New York	W
Diamond C. See Chapin Co., Chas. E.	
Dixon Crucible Co., Joseph, Jersey City	
Electra. See Automotive Mfg. Co.	
Electric Accessories Co., 310 York Ave., Philadelphia, Pa.	H
Electro-Nite Carbon Co., 808 N. Fourth, Philadelphia, Pa.	C
Eureka Metal Products Corp., 2210 Elmwood Ave., Buffalo, N. Y.	W S H
Fleck Carbon Co., 508 Broome, New York	C
General Electric Co., Schenectady, N. Y.	C H
Graphalloy. See Graphite Metallizing Corp.	
Graphite Metallizing Corp., 1050 Nepperhan Ave., Yonkers, N. Y.	C H
Graphite Products Co., 98 Park Place, New York, N. Y.	C
Holland Trolley Supply Co., 1623 E. 43rd, Cleveland, Ohio	H
Jeandron, W. J., 345 Madison Ave., New York, N. Y. (Imported.)	C
Keystone Carbon Co., 4630 N. 21th, Philadelphia, Pa.	C
Kohlenite Products Co., 92-34 152nd St., Jamaica, N. Y.	C
Le Carbone. See Jeandron, W. J.	
Le Valley Vitae Carbon Brush Co., 4851 Grand Central Terminal, New York, N. Y.	C
Marks Elec. Co., Hiram, 304 Woodward Ave., Detroit, Mich.	C
Morganite Brush Co., 33-02 48th Ave., Long Island City, N. Y.	C
National Carbon Co., Cleveland, O.	C
New Process Carbon Co., 1503 Columbia Ave., Philadelphia, Pa.	C L
No Spark. See Calebaugh Self-Lubricating	
Ohio Carbon Co., 12508 Almira Ave., Cleveland, Ohio	C W L

Ohio Elec. Specialty Mfg. Co., Troy, O.	W
Perfection Supply Co., 98 Park Pl., New York, N. Y.	C W S H L
Pittsburgh Carbon Brush Co., 801 Fulton, Pittsburgh, Pa.	C
Pure Carbon Co., Wellsville, N. Y.	C W S L
Pyramid. See National Carbon Co.	
Reactive. See Baylis Co.	
Reading Elec. Co., Inc., 24 Frankfort, New York, N. Y.	C L
Rome Wire Co., Div. of General Cable Corp., Rome, N. Y.	W L
Salem Electrical Supply Co., Salem, Mass.	W
Smarr & Co., Geo. W., 110 S. Ninth, St. Louis, Mo.	C
Speer Carbon Co., St. Mary's, Pa.	C
Stackpole Carbon Co., St. Mary's, Pa.	C
Sterling. See Carbon Laboratories Co.	
Superior Carbon Products Co., North Rd., Poughkeepsie, N. Y.	C
U. S. Graphite Co., Saginaw, Mich.	C
Universal. See Graphite Metallizing Corp.	
Weber Elec. Wks., Brooklyn Sta., Cleveland	C L

BRUSHES, PNEUMATIC SPRAYING. See Spraying Outfits, etc.

BRUSHES FOR VACUUM CLEANERS
Omaha Bruan Co., 320 N. 15th, Omaha, Neb. (Brushes rebristled.)
Osborn Mfg. Co., 5491 Hamilton Ave., Cleveland, Ohio.

BUGGIES, Armature. See Lifts, Armature.

BULBS, Glass
For Incandescent Lamps and Tubes.
Alme Mfg. Co., 38 Crawford, Newark, N. J.
Corning Glass Wks., Corning, N. Y.
Fayette Glass Bulb Co., 229 21st, Brooklyn, N. Y.

BUNCHING MACHINES. See Wire Manufacturing Machines.

BUS BAR. See Brass, Bronze and Copper. Also Aluminum.

BUSHINGS, SHAFT. See Bearings and Bushings.

BUSHINGS, Box and Cabinet, Porcelain
Appleton Electric Co., 1703 Wellington Ave., Chicago, Ill.
Columbia Metal Box Co., 226 E. 144th St., New York, N. Y.
Harter. See Multi Elect. Mfg. Co.
Knox Porcelain Corp., Knoxville, Tenn.
Minerallac Electric Co., 1045 Washington Blvd., Chicago, Ill.
Multi Electric Mfg. Co., 1840 W. 14th Ave., Chicago, Ill.
Nelson Elec. Co., Plant City, Fla.

CABINET GRILL CLOTH See Cloth, Untreated.

CABINETS, Fibre
Continental-Diamond Fibre Co., Bridgeport, Pa.
Valewood. See Continental-Diamond Fibre Co.

CABINETS, Refrigerator. See Refrigerator Cabinets.

CABINETS, Sheet Steel
Stamped and Turned-up Boxes and Cabinets.
Acme Blow Pipe & Sheet Metal Wks., New Orleans, La.
Adam Electric Co., Frank, St. Louis, Mo.
All-Steel-Equip. Co., Aurora, Ill.
American Metal Wks., 4868 Stanton Ave., Philadelphia, Pa.
American Steel Furniture Co., 27 W. 24th, New York, N. Y.
Artisan Sheet Metal Corp., 53 Gorham, Rochester, N. Y.
Aurora Steel Products Co., Aurora, Ill.
Benjamin Elec. Co., 1378 E. 16th, Los Angeles, Cal.
Berks Engineering Co., Reading, Pa.
Berthold Elec. Co., Gus, 551 W. Monroe, Chicago, Ill.
Bonnell Elec. Mfg. Co., 102 Chambers, New York, N. Y.
Chicago Hdwe. Foundry Co., North Chicago, Ill.
C. & P. Electric Wks., Springfield, Mass.
Coast Specialty Co., 73 E. Sixth, Portland, Ore.
Cole Electric Products Co., 83 Crescent, Long Island City.
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.
Columbia Elec. Mfg. Co., 59 Columbus Sq., San Francisco, Cal.
Columbia Metal Box Co., 226 E. 144th, New York, N. Y.
Columbian Steel Tank Co., 1505 W. 12th, Kansas City, Mo.
Commercial Mfg. & Supply Co., 1443 Delaware St., Denver.
Creiger Electrical Mfg. Co., 609 W. Lake, Chicago, Ill.
Diamond Elec'l Mfg. Co., 1230 E. 16th, Los Angeles, Cal.
Dowman-Dozier Mfg. Co., 1314 Murphy Ave., S. W., Atlanta, Ga.
Electric Apparatus Co., 704 N. Halsted, Chicago, Ill.
Electric Panelboard Co., 426 Exchange, Rochester, N. Y.
Federal Steel Products Co., 2 Ave. L, Newark, N. J. (Polarized Boxes.)
Fouch Elec. Mfg. Co., 105 N. Ninth, Portland, Ore.
Greater New York Metal Box Co., Inc., 143 W. 19th, New York.
Gurney Sheet Metal Wks., 718 E. 4th, Long Beach, Cal.
Holzer Sheet Metal Wks., Inc., New Orleans, La.
Isert Co., J. H., 1234 Rowan, Louisville, Ky.
Karp Metal Products Co., 129 30th, Brooklyn, N. Y.
Large-Dail Mfg. Co., 311 N. Tenth, Philadelphia.
Lexington Elec. Products Co., 12 Chapel, Newark, N. J.
Lorentzen, H. K., 155 Leonard, New York, N. Y.
MacMillen Mfg. Co., 1400 N. Spring, Los Angeles, Cal.
Mansfield Elec. Hardware Co., Longview Ave., Mansfield, O.
Metropolitan Elec. Co., 2914 First Ave., S., Seattle, Wash.
Metropolitan Elec. Products Co., Blvd. at 14th, Long Island City, N. Y.
Milwaukee Vault & Cabinet Co., 521 Market, Milwaukee.
Mosher, S. L., 1951 Lawrence, Denver, Colo.
National Metal Box Co., Van Dyke & Ferris Sts., Brooklyn.
Newman Elec. & Mfg. Co., Eau Claire, Wis.
Par-Metal Products Corp., 3519 41st, Long Island City, N. Y.
Penn Electrical Co., 35 Water, Irwin, Pa.
Powerlite Switchboard Co., 4149 E. 79th, Cleveland, O.
Reelich. See Holzer Sheet Metal Works.
Robbins & Myers Sales, Inc., Springfield, O.
Security. See Aurora Steel Products Co.
Standard Metal Box Corp., 950 Grand St., Brooklyn, N. Y.
Star Metal Box Co., 238 46th, Brooklyn, N. Y.
Superior Switchboard & Devices Co., 420 Schroyer Ave., Canton, O.
Tanner & Co., Wm. F., 511 S. Sharp, Baltimore, Md.
United Metal Box Co., 473 President, Brooklyn, N. Y.
United Sheet Metal Wks., 575 Howard, San Francisco.
Universal Metal Box & Products Co., 316 Colt, Irvington, N. J.
Wadsworth Elec. Mfg. Co., Covington, Ky.
Wiegman & Co., E. M., 1908 Benton, St. Louis, Mo.
Wurlnick Elec. Mfg. Co., 4444 Clayton Ave., St. Louis, Mo.

CABINETS AND BOXES, Wood
Accurate Molding Corp., 20 Morton, Brooklyn, N. Y.
Adler Mfg. Co., Louisville, Ky.
Adler Royal. See Adler Mfg. Co.
Ampere. See Donehue Lumber Co.
Art Woodworking Co., Inc., 1035 Seattle Blvd., Seattle.
Aston Cabinet Mfrs., 1233 W. Lake, Chicago, Ill.
Blackhawk Furniture Co., Rockford, Ill.
Boehm Cabinet Co., J., 2216 W. 63rd St., Cleveland, O.
Carlon. See Art Woodworking Co.
Carolina Wood Products Co., Asheville, N. C.
Carrom Co., Ludington, Mich.
Caswell-Runyon Co., Huntington, Ind.
Cary Cabinet Corp., 1427 N. 15th, St. Louis, Mo.
Cheney Piano Action Co., A. C., Castleton, N. Y.
Chickasaw Furniture Mfg. Co., Memphis, Tenn.
Conrades Mfg. Co., 1942 N. Second, St. Louis, Mo.
Conner Furniture Co., New Albany, Ind.
Continental Radio Corp., East Pontiac, Extended, Fort Wayne, Ind.
Corbett Cabinet Mfg. Co., St. Mary's, Pa.
Cory Cabinet Corp., Springfield, Mo.
Dafker Co., Geo., Henderson, Ky.
Ebert Furniture Co., 225 W. 34th, New York, N. Y.
Eilein & Sons, Frederick, 44 Central Ave., Brooklyn, N. Y.
Empire-United Hat Block Co., 312 E. 22nd, New York.
Estes & Sons, E. B., 5844 Grand Central Terminal Bldg., New York, N. Y.
Excel Phonograph Mfg. Co., 400 W. Erie, Chicago, Ill.
Excello Products Corp., 4836 W. 16th, Cicero, Ill.
Federal Wood Products Corp., 206 Lexington Ave., New York, N. Y.
Grand Rapids Furniture Co., Grand Rapids, Mich.
Harper Mfg. Co., Cassopolis, Mich.
Hickory Box Co., Hickory, N. C.
Hubbell, H. L., 59 Market Ave., N. W., Grand Rapids.
Interstate Woodworking Co., 48 Wooster, New York, N. Y.
Karpen. See Studner Bros.
Kiel Furniture Co., 32nd and Center Sts., Milwaukee, Wis. (Radio Table).
King Mfg. Corp., 254 Rano, Buffalo, N. Y.
Klumpp Sons, John G., 13 Baxter, New York, N. Y.
Knoxville Table & Chair Co., Knoxville, Tenn.
National Cabinet Co., New Philadelphia, O.
New England Box Co., Greenfield, Mass.
Ohio Valley Cabinet Co., Wheeling (Warwood), W. Va.
Oneida Cabinet Corp., Oneida, N. Y.
Ottawa Furniture Co., Holland, Mich.
Phone-End-Table. See Continental Radio Corp.
Pooley Co., 16th & Indiana Ave., Philadelphia, Pa.
Radio Allied Mfrs. Corp., 1340 S. Michigan Ave., Chicago.
Radio Cabinet Mfg. Corp., Furniture Mart, Chicago, Ill.
Radio Cabinet & Equipment Co., 1504 Vine, Philadelphia.
Radio Mfg. Co., Div. of Pilliiod Lumber Co., Swanton, O.
Radio Master Corp., Bay City, Mich.
Red Lion Cabinet Co., Red Lion, Pa.
R. E. Z. Cabinet Co., 54 North, Boston, Mass.
Schutz Bros., 153 Chambers, New York, N. Y.
Showers Bros. Co., Bloomington, Ind.
Signal Elec. Mfg. Co., Menominee, Mich.
Southern Toy Co., Hickory, N. C.
Specialty Display Case Co., Kendallville, Ind.
Starr Piano Co., Richmond, Ind.
Stettner Phonograph Corp., 689 Kent Ave., Brooklyn, N. Y.
Studner Bros., 47 W. 44th, New York, N. Y.
Superior Cabinet Corp., 206 Broadway, New York, N. Y.
Syracuse Screen & Grille Co., North Manchester, Ind.
Tessier Bros., 355 Bridge, Northampton, Mass. (Radio.)
Trenton Wood Specialty Co., Stokes Ave. and P. R. R., Trenton, N. J.
Udell Wks., 28th and Barnes Ave., Indianapolis, Ind.
Watsontown Table & Furniture Co., Watsontown, Pa.
West Box Co., 235 Liberty, Springfield, Mass.
Wood Cabinet Corp., 196 Lexington Ave., New York, N. Y.

CABLE ARMORING MACHINES. See Wire Manufacturing Machines.

CABLE TEST SETS. See Instruments, Portable and Switchboard.

CABLING MACHINES. See Wire Manufacturing Machines.

CANDLES, Fixture
Glass, Fibre Paper.
Brandywine Fibre Products Co., 1402 Walnut, Wilmington.
Cleveland Container Co., 10619 Berea Rd., Cleveland, O.
Fibre Products Co., New Bedford, Mass.
Franklin Fibre Specialty Co., 173 Lafayette, New York, N. Y.
Phoenix Glass Co., Monaca, Pa.
Remington Mfg. Co., 939 Barnum Ave., Bridgeport, Conn.
Seamless. See Fibre Products Co.
Universal Brass Wks., 209 Vine, Philadelphia, Pa.

CANOPY (Canopies). See Fixture Fittings.
Insulators. See Insulators.
Switches. See Switches, Snap.

CAPACITORS, RADIO. See Radio Circuit Components.

CARBON, Powdered
Marks Elec. Co., Hiram, 304 Woodward Ave., Detroit, Mich.

CARBONS, Battery. See Carbons.
Arc Light. See Carbons.

CARBONS
Battery Arc Light.
Becker Bros. Elec'l Corp., 23 N. Jefferson, Chicago, Ill.
Blanck & Carrier Corp., 115 W. 63rd, New York, N. Y.
Columbia. See National Carbon Co.
Daylight. See National Carbon Co.
Lessing Battery. See Blanck & Carrier Corp.
Nuernberg Battery. See Blanck & Carrier Corp.
National Carbon Co., Cleveland, Ohio.
Oretip. See National Carbon Co.
Speer Carbon Co., St. Mary's, Pa.
Stackpole Carbon Co., St. Mary's, Pa.
White Flame. See National Carbon Co.

CARTONS. See Boxes and Wrappers.

CASEIN PLASTICS. See Molded Insulation.

CASES, Eliminator. See Cases, Eliminator.
Flashlight. See Cases, Flashlight.

CASES, Eliminator
Brumberger Co., 252 Pearl, New York, N. Y.
Grand Sheet Metal Wks., 176 Grand, New York, N. Y.
Karp Metal Products Co., 129 30th, Brooklyn.
Luna Metal Products Co., 38 Emerson Pl., Brooklyn, N. Y.

BOOST Your Sales in Metropolitan New York

ASSIST Your New York distributor

REACH Every Dealer, Dealer-Contractor, Contractor, Central Station and Jobber within a radius of 50 miles of New York City

DETAILS on request. Write

METROPOLITAN ELECTRICAL NEWS

Devoted to New York Metropolitan District Electrical Activities.

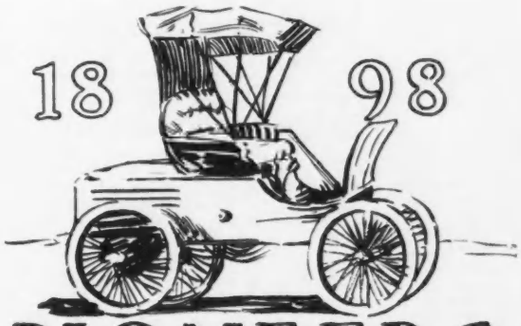
461 EIGHTH AVENUE NEW YORK, N. Y.

NATIONAL VULCANIZED FIBRE COMPANY
ROGERS FIBRE COMPANY

The Leatheroid and Vulcanized Fibre business of the Rogers Fibre Company has been purchased by the National Vulcanized Fibre Company who will immediately take charge, direct and control all matters and details pertaining to the business.

Those who have looked to the Rogers Fibre Company for their source of supply of Vulcanized Fibre are urged to continue their patronage with the National Company and communications may be addressed to Mr. Leon B. Rogers, Sales Department, National Vulcanized Fibre Company, Wilmington, Delaware.

Vulcanized Fibre, Leatheroid, Rods, Tubes and Special Shapes in Both Vulcanized Fibre and Laminated Bakelite.



PIONEERS

Even when those first horseless buggies began chugging down "Main Street" the pioneers of the automobile industry were constantly reaching out for improvements.

By this same method of continual research and advancement, Boonton Rubber, long ago, became the first molders of Bakelite as electrical insulation.

From the very beginning we have consistently improved our methods and equipment.

Now, electrical manufacturers may be assured that Boonton can execute, with accuracy and speed, any sized order for molded insulation in Bakelite.

"BOONTON BAKELITE"

BOONTON RUBBER MFG. COMPANY

Boonton, New Jersey

Established 1891

SYNTHANE

Laminated Bakelite

Dependable Uniformity in Electrical and Mechanical Properties

DIELECTRIC STRENGTH
LOW WATER ABSORPTION
STRUCTURAL STRENGTH
LOW SURFACE LEAKAGE
CLEAN PUNCHING
MACHINEABILITY
IMPACT STRENGTH
APPEARANCE

SYNTHANE

CORPORATION OAKS-PENNA

NEW YORK, CHICAGO, CLEVELAND, SAN FRANCISCO

Sheets, Tubes, Rods, Fabricated Parts

AVAILABLE--

. . . to Electrical Manufacturers, over 36 years' successful experience in DIE-CASTING. The good will of a long list of satisfied customers is proof of our ability to serve efficiently and economically. Our own metallurgist checks alloys used in all our castings. We design and make our own dies. Let us quote.

Franklin Die Casting Corporation
826 Gifford St., Syracuse, N. Y.
Pioneers of the Die-Casting Industry

CASES, Flashlight
Bridgeport Brass Co., 744 E. Main, Bridgeport, Conn
Lincoln Fibre Specialty Co., Newport, Del.
St. Louis Paper Can & Tube Co., St. Louis, Mo.

CASTINGS, Aluminum. See Castings, Aluminum. Also Castings, Copper, etc.
Brass. See Castings.
Bronze. See Castings.
Copper. See Castings.
Die. See Castings, Die.
Monel Metal. See Castings.
Steel. See Castings, Steel.
White Metal. See Castings.

CASTINGS, Aluminum
American Aluminum Ware, 305 Jeliff Ave., Newark, N. J.
Aluminum Co. of America, 2471 Oliver Bldg., Pittsburgh
Bergen Point Brass Foundry, Sixth & Ave A, Bayonne, N. J.
Berks Foundry & Mfg. Co., West Hamberg, Pa.
Bohn Aluminum & Brass Corp., 2512 E. Grand Blvd., Detroit, Mich.
Bonnell Elec. Mfg. Co., 192 Chambers, New York, N. Y.
Dick Bros., Inc., Reading, Pa.
Eureka Metal Products Corp., 2210 Elmwood Ave., Buffalo, N. Y.
Fairmont Aluminum Co., Fairmont, W. Va.
Monarch Aluminum Ware Co., 9301 Detroit Ave., Cleveland
National Bronze & Aluminum Foundry Co., 88th & Lazy, Cleveland O.
Quality Aluminum Casting Co., Waukesha, Wis
Sterling Die Casting Co., 749 39th, Brooklyn, N. Y.
Tenual. See National Bronze & Aluminum Foundry Co
United Metal Mfg. Co., Inc., 25 Shipping, Norwich, Conn.
Veco Mfg. Co., South Norwalk, Conn.

CASTINGS, Die
Advance Tool & Die Casting Co., 1654 Holton, Milwaukee.
Alemite Die-Casting & Mfg. Co., Woodstock, Ill.
Allied Die-Casting Corp., Long Island City, N. Y.
Alumac. See Aluminum Co. of America.
Aluminum Co. of America, 2471 Oliver Bldg., Pittsburgh.
American Brass Co., Waterbury. Conn.
Anaconda. See American Brass Co.
American Die Casting Co., 2040 Dominick, Chicago, Ill.
Badger Die Casting Co., 155 Buffalo, Milwaukee, Wis.
Barnhardt Bros. & Spindler, Monroe & Throop St. Chicago.
Bohn Aluminum & Brass Corp., 2512 E. Grand Blvd., Detroit, Mich.
Bohnalite. See Bohn Aluminum & Brass Corp.
Do-Lit. See Doehler Die Casting Co.
Doehler Die Casting Co., 386 Fourth Ave., New York, N. Y.
Franklin Die Casting Corp., 826 Gifford, Syracuse, N. Y.
Illinois Die Castings Co., 551 W. Congress, Chicago, Ill.
Krone-Seebek Die Casting & Mfg. Co., 2935 W. 47th, Chicago, Ill.
Milwaukee Die Casting Co., 289 Fourth, Milwaukee, Wis.
National Die Casting Co., 600 N. Albany Ave., Chicago.
Newton Die Casting Corp., 146 Munson, New Haven Conn.
Paragon Die Casting Co., 2701 N. Crawford Ave., Chicago.
Parker White Metal & Machine Co., Erie, Pa.
Permite. See Aluminum Industries, Inc
Phoenix Die Castings Co., 21 Illinois, Buffalo, N. Y.
Pittsburgh Die Casting Co., 7508 Ardmore, Swissvale, Pa.
Precision Die Casting Corp., Syracuse, N. Y.
Republic Die Casting Co., 128 Mott, New York, N. Y.
Stewart Die Casting Co., 4500 Fullerton Ave., Chicago, Ill.
Superior Die Casting Co., 875 E. 70th, Cleveland, Ohio.
Twin City Die Castings Co., Talmadge and 33rd Aves., S. E., Minneapolis, Minn. (White Metal).

CASTINGS, Gray Iron
American Engineering Co., Philadelphia, Pa.
Athens Foundry Co., Athens, Pa.
Barlow Foundry Co., 551 N. J. R. R. Ave., Newark, N. J.
Barnett Foundry Co., Newark, N. J.
Berks Foundry & Mfg. Co., West Hamberg, Pa.
Bonnell Elec. Mfg. Co., 192 Chambers, New York, N. Y.
Bridgeport Castings Co., 250 North Ave., Bridgeport, Conn.
Chicago Hardware Foundry Co., North Chicago, Ill.
Dick Bros., Inc., Reading, Pa.
Fairmount Foundry, Inc., Third & Westmoreland Sts., Philadelphia, Pa.
Farquhar Co., Ltd., A. B., York, Pa.
Forest City-Walworth Run Foundries Co., 2500 W. 27th, Cleveland, O.
Gray Iron Foundry Co., Reading, Pa.
Laytham & Son Co., Wm. P. 889 Market, Paterson, N. J.
Milwaukee Grey Iron Foundry Co., 3910 Mitchell, Milwaukee, Wis.
North Lebanon Foundry Co., Second & Canal, Lebanon, Pa.
North Wales Mach. Foundry Co., North Wales, Pa.
Products Machine Co., Bridgeport, Conn.
Parks Iron Foundry, L., 357 Wilson Ave., Newark, N. J.
Sharples Separator Co., Biddle & Patten Ave., Westchester, Pa.
Snead & Co., Pine St., Jersey City, N. J.
Union Mfg. Co., New Britain, Conn.
Western Foundry Co., Kedzie Ave. at 36th, Chicago, Ill.

CASTINGS, Malleable Iron
Eastern Malleable Iron Co., Naugatuck, Conn.
Southern Malleable Iron Co., 21st & Bond Ave., East St. Louis, Ill.
St. Louis Malleable Castings Co., 7701 N. Conduit Ave., St. Louis, Mo.

CASTINGS, Non-Ferrous
Copper, Brass, Bronze, Monel Metal, White Metal.
Anderson Mfg. Co., Albert & J. M., 289 A. Boston Wor-
American Manganese Bronze Co., Holmesburg, Philadelphia.
Atlas Brass Foundry Co., Columbus, O.
Barnard Foundry Co., 9 Roseland, Springfield Mass
Bergen Point Brass Foundry, Sixth & Ave A, Bayonne, N. J.
Berks Foundry & Mfg. Co., West Hamberg, Pa
Bohn Aluminum & Brass Corp., 2512 E. Grand Blvd., Detroit, Mich
Bonnell Elec. Mfg. Co., 192 Chambers, New York, N. Y.
Buffalo Bronze Die Cast Corp., 100 Arthur, Buffalo, N. Y.
Bridgeport Castings Co., 250 North Ave. Bridgeport, Conn.
Cadman Mfg. Co., A. W., Pittsburgh, Pa.
Central Pattern & Foundry Co., 3737 S. Sacramento Ave. Chicago, Ill.
Chase Brass & Copper Co., Waterbury, Conn.
Chicago Hardware Foundry Co., North Chicago, Ill.
Creamer & Co., W. G., 572 Smith, Brooklyn, N. Y.
Davis & Zuckerman, 514 E. 11th, New York, N. Y.
Delta Star Electric Co., 2437 Fulton, Chicago, Ill.
Dick Bros., Inc., Reading, Pa.
Erie Bronze Co., 1852 Chestnut, Erie, Pa.
Eureka Metal Products Corp., 2210 Elmwood Ave., Buffalo, N. Y.
Farries Mfg. Co. Decatur, Ill.
Federal-Mogul Corp., Shoemaker & Millibridge Sts., Detroit
Harsch Bronze & Foundry Co., John, 11612 Madison Ave., Cleveland, O.
Johnson Bronze Co., New Castle, Pa.
McGill Metal Co., Valparaiso, Ind.
National Bronze & Aluminum Foundry Co., 88th & Lazy, Cleveland, O.
Ohio Pattern Wks. & Fdy. Co., 2730 Spring Grove Ave Cincinnati, O.
Rabun Bronze Foundry, 617 West Belgrave, Huntington Park, Cal.
Sterling Art Metal Wks., 40 Purvis, Long Island City, N. Y
Tenual. See National Bronze & Aluminum Foundry Co
United Metal Mfg. Co., Inc., 25 Shipping, Norwich, Conn

CASTINGS, Steel
Bonney-Floyd Co., Marion Rd., Columbus, Ohio
Eastern Steel Casting Co., Ave. L & Edward St., Newark
Northwestern Steel & Iron Corp., 2907 Fourth, S. E., Minneapolis, Minn.
Pittsburgh Malleable Iron Co., Pittsburgh, Pa.
Procian. See Northwestern Steel & Iron Corp.
Riverside Steel Casting Co., Jacobus Ave., Kearney, N. J
Sivyer Steel Castings Co., Milwaukee, Wis.

CEMENT, Commutator
Anchorlute. See Technical Products Co.
Commutator Companion. See Withington Div. of Marnot Co.
Conductalute. See Technical Products Co.
Early, Edward E., 1129 W. Fifth, N. W., Canton, O.
Fixkwick. See Technical Products Co.
Ideal Commutator Dresser Co., 1039 Park Ave., Sycamore, Ill.
Imperial. See Martindale Electric Co.
Martindale Elec. Co., 1261 W. Fourth, Cleveland, O.
Mitchell Rand Mfg. Co., 19 Vesey, New York, N. Y.
Perco-Lute. See Perfection Supply Co.
Perfection Supply Co., 98 Park Pl., New York, N. Y.
Plas Mica Co., 26 St. Andrews Place, Yonkers, N. Y.
Technical Products Co., Pittsburgh, Pa.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa
Withington Div. of Marnot Co., 50 Thayer, Boston, Mass.

CEMENT, Liquid Porcelain
Anchorlute. See Technical Products Co.
Color-Bestos. See Technical Products Co.
Fire Lute. See Technical Products Co.
Insa-Lute. See Technical Products Co.
Okonite Co., Passaic, N. J.
Patch-O-Namel. See Technical Products Co.
Repairet Mfg. Co., Milwaukee, Wis.
Stupakoff Laboratories, 6627 Hamilton Ave., Pittsburgh, Pa.
Technical Products Co., Pittsburgh, Pa.
Thermold. See Technical Products Co.

CHAIN, Chandelier (Fancy). See Crystals, Chandelier.
CHAIN DRIVES. See Chain, Power Transmission.

CHAIN, Fixture
Acco. See American Chain Co.
American Chain Co., Bridgeport, Conn.
Chase Brass & Copper Co.
Eastern Chair Works, 309 E. 22nd St., New York, N. Y
Faries Mfg. Co., Decatur, Ill.
Globe Metal Mfg. Co., 2122 E. Hazard, Philadelphia, Pa
H. & O. Chain Co., So. Norwalk, Conn.
Newark Metal Mfg. Co., 22 S. 6th, Newark, N. J.
Plume & Atwood Mfg. Co., Waterbury, Conn.
Rodale Mfg. Co., 200 Hudson, New York, N. Y.
Steele & Johnson Mfg. Co., Waterbury, Conn.
Universal Metal Chain Co., 75 Clymer, Brooklyn, N. Y

CHAIN, Power Transmission
Baldwin Chain & Mfg. Co., Worcester, Mass.
Boston Gear Wks. Sales Co., Norfolk Downs, Mass
Diamond Chain & Mfg. Co., Indianapolis, Ind.
Link-Belt Company, 910 S. Michigan Ave., Chicago, Ill.
Morse Chain Co., Ithaca, N. Y.
Ramsey Chain Co., Inc., Albany, N. Y.
Reeves Pulley Co., Columbus, Ind.
Renold Boston. See Boston Gear Wks.
Union Chain & Mfg. Co., Sandusky, O.
Whitney Mfg. Co., Hartford, Conn.

CHAIN, Socket
American Ball Chain Works, 12 Wooster St., New York.
Bead Chain Mfg. Co., Bridgeport, Conn.
H. & O. Chain Co., South Norwalk, Conn.

CHANDELIER BEADS. See Crystals, Chandelier.
CHANDELIER CRYSTALS. See Crystals, Chandelier
CHANDELIER FRINGE. See Crystals, Chandelier

CHARGERS, Magnet
Charging, Remagnetizing.
Colpin Corp., 6110 S. Main, Los Angeles, Cal.
Cowie Elec. Co., E. S., 1823 Wyandotte, Kansas City, Mo
Fore Elec. Mfg. Co., 5255 Wabada Ave., St. Louis, Mo
Luma Elec. Equipment Co., Toledo, O.
Scintilla Magneto Co., Inc., Sidney, N. Y.
Valley Electric Co., 4221 Forest Park Blvd., St. Louis, Mo.

CHEMICALS, Battery
Electrolyte, Battery Salts, Battery Oxides, Sal Ammoniac, Bluestone, Manganese.
Cooper & Co., Charles, 194 Worth, New York, N. Y.
Eagle-Picher Lead Co., 134 N. LaSalle, Chicago. (Oxide.)
Elmer & Amend, 205 3rd Ave., New York, N. Y.
Elsevex. See Goodyear Chemical Co., Inc.
Electro Chemical Co., 113 W. Court St., Dayton, O.
General Metallic Oxides Co., Jersey City, N. J.
Globe Chemical Co. Murray Rd. and Big Four R. R. (St. Bernard), Cincinnati, O.
Goodyear Chemical Co., Inc., 20 W. 22nd, New York, N. Y.
Grasselli Chemical Co., Guardian Bldg., Cleveland, O
Kalbfleisch Corp., 200 5th Ave., New York, N. Y.
Klinestein Co., 644 Greenwich, New York, N. Y.
Lightning Co., St. Paul, Minn.
Merrimac Chemical Co., 148 State, Boston, Mass.
Powers-Weightman-Rosengarten Co., Philadelphia, Pa
Voltah. See Powers-Weightman-Rosengarten Co.
Wah Chang Trading Corp., 233 Broadway, New York, N. Y

CHEMICALS, Refrigeration
Ansul Chemical Co., Marinette, Wis.
Arctic. See Roessler & Hasslacher Chemical Co.
Calco Chemical Co., Bound Brook, N. J.
Carbide & Carbon Chemicals Corp., 30 E. 42nd, New York, N. Y. (Butane & Isobutane.)
Dry Ice Corp. of America, 50 E. 42nd, New York, N. Y
Roessler & Hasslacher Chemical Co., 709 Sixth Ave., New York, N. Y. (Methyl Chloride, Ethyl Chloride.)

COLOR-BESTOS FIREPROOF ACIDPROOF OILPROOF
An insulating cement or paint made in standard colors including white.
Trial ½ gal can $2.00
TECHNICAL PRODUCTS COMPANY
Makers of Insa-Lute Liquid Porcelain
Pittsburgh (15) Pa.

FARQUHAR
Gray Iron Castings
Plate Construction
Electric Welding~
Special Machinery
Our Own Pattern and Machine Shop
A.B. FARQUHAR CO., LIMITED, YORK, PA.

Virginia Smelting Co., West Norfolk, Va. (Sulphur Dioxide.
Chromium Plating. See Plating & Finishing.

CHUCKS, Magnetic
J & H Elec. Co., 200 Richmond, Providence, R. I.
Simmons. See Taft-Pierce Mfg. Co.
Taft-Peirce Mfg. Co., Woonsocket, R. I.
Walker Co., O. S. (Rockdale), Worcester, Mass.

CIRCUIT BREAKERS
Air and Oil Circuit Breakers and Oil Break Switches.
Allen-Bradley Co., 493 Clinton, Milwaukee, Wis.
Anderson & Co., C. J., 212 W. Austin Ave., Chicago, Ill.
Automatic Reclosing Circuit Breaker Co., Columbus, O.
Burke Controller Co., 349 Lexington Ave., New York, N. Y.
Condit Elec'l Mfg. Corp., 838 Summer St. (South Boston), Boston, Mass.
Cutler-Hammer, Inc., 1238 St. Paul Ave., Milwaukee. (Mercury Type).
Domestic Elec. Co., Kent, O.
General Electric Co., Section W-234, Bridgeport, Conn.
Hart & Hegeman Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.
Hartman Electrical Mfg. Co., 31 E. Fifth, Mansfield, Ohio.
High Tension Elecl. Specialty Co., 500 Washington, Abington, Mass.
Hiteco. See High Tension Elecl. Specialty Co.
H. & H. See Hart & Hegeman Div.
Inducto-therm. See Allen-Bradley Co
I. T. E. Circuit Breaker Co., 19th and Hamilton Sts., Philadelphia, Pa.
Line Material Co., South Milwaukee, Wis. (Oil Switches.)
Maple Co., R. H., 3156 Ruckle, Indianapolis, Ind.
Martindale Elec. Co., 1262 W. Fourth, Cleveland, O.
Minibraker. See Burke Controller Co.
Roller-Smith Co., 239 Broadway, New York, N. Y.
Sentinel. See Westinghouse Elec. & Mfg. Co.
Takamine Corp., 208 Rawson, Long Island City, N. Y.
Time-O-Stat Controls Co., Elkhart, Ind.
U-Re-Lite. See I. T. E. Circuit Breaker Co
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa

CIRCUIT TESTERS. See Testers, Fuse and Circuit
CLEANER BAGS, Vacuum. See Bags, Vacuum Cleaner
CLEANER BRUSHES, Vacuum. See Brushes for Vacuum Cleaners.

CLEANERS, Metal
Oakite Products, Inc., 26 Thames, New York, N. Y
CLIPS, Fuse. See Fuse Clips.

CLIPS, Heater Plug
Gray Bros. Co., Piano, Ill.

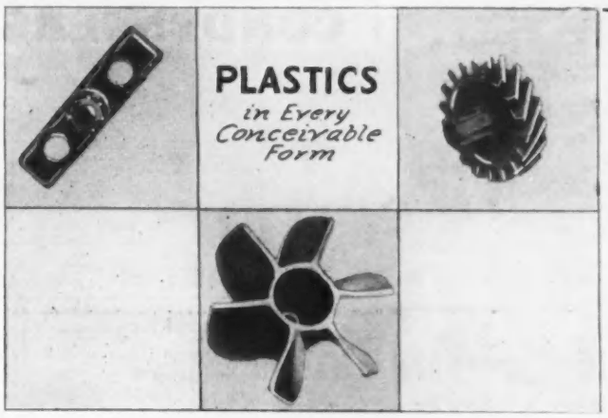
CLOCK SWITCHES. See Switches, Time.
CLOTH GEARS. See Gears and Pinions, Composition.
CLOTH LOUD SPEAKER DIAPHRAGM. See Cloth, Untreated.
CLOTH RADIO GRILL. See Cloth, Untreated.

CLOTH, Untreated
Boyle & Co., John, 112 Duane, New York, N. Y.
Canvas, "Aeroplane Cloth," Cotton Duck, Drill, Diaphragm Cloth, Grill Fabrics, etc
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y
Pindall Fabrics Corp., 200 Madison Ave., New York, N. Y. (Grill Cloth)
Walker Cotton Fabrics Co., 327 S. La Salle, Chicago, Ill

CLOTH, WIRE
(For Radio Tube Screens)
Buffalo Wire Works Co., 588 Terrace, Buffalo, N. Y.

CLOTH AND PAPER, Insulating
Cloth, Insulated ..... See C
Paper, Insulated ..... See P
Fibre Paper (Fish Paper) ..... See F
Press Board (Fuller Board) .... See B
Silk ..... See S

	C	S	P		
Acme Wire Co., New Haven, Conn.	C	S	P		
Armco. See Rogers Paper Mfg. Co.					
Armarite. See Mica Insulator Co.					
Behr-Manning Corp., Troy, N. Y.			P		
Brand & Co., Wm., 268 4th Ave., New York.			P		
Campbellite. See National Vulcanized.					
Carboloid Products Corp., 98 Front, Brooklyn, N. Y.	C		P		
Case Brothers, Inc., Highland, Park, Conn.			P		B
Case Mfg. Co., Unionville, Conn.			P		
Case & Risley Press Paper Co., Oneco, Conn.					
Celoron Co., Bridgeport Pa.			P	F	B
C-F. See National Vulcanized Fibre Co.					
Chicago Mica Co., 345 Campbell, Valparaiso, Ind.	C				
Columbian Rope Co., Auburn, N. Y.			P		
Continental-Diamond Fibre Co., Bridgeport, Pa			P		
Consumers Rubber Co., 1302 Ontario, N., Cleveland, O.			P		
Coruco. See Consumers Rubber Co.					
De Jonge & Co., Louis, 69 Duane, New York, N. Y. (Condenser)			P		
Dexstar. See Dexter & Sons.					
Dexter & Sons, C. H., Windsor Locks, Conn. (Condenser Tissue.)			P		
Dielectric Mfg. Co., St. Louis, Mo.	C	S	P		B
Electrite. See West Virginia Pulp & Paper Co.					
Fyberoid. See Wilmington Fibre Specialty Co.					
General Electric Co., Merchandise Dept., Bridgeport, Conn.	C		P		
Chandise Dept., Bridgeport, Conn.	C		P		
Hartford City Paper Co., Hartford City, Ind. (Glassine Condenser Tissue).					
Hewitt & Bros., C. B., 16 Ferry, New York	C		P		
Hi-Tex See Stevens Paper Mills.					
Hollingsworth & Vose Co., 333 Washington, Boston, Mass.			P		
Insulite Co. See Tarentum Paper Mills Co.					
Insuline Corp. of America, 78 Cortlandt, New York, N. Y.				F	
Irvington Varnish & Insulator Co., Irvington, N. J.	C	S	P		



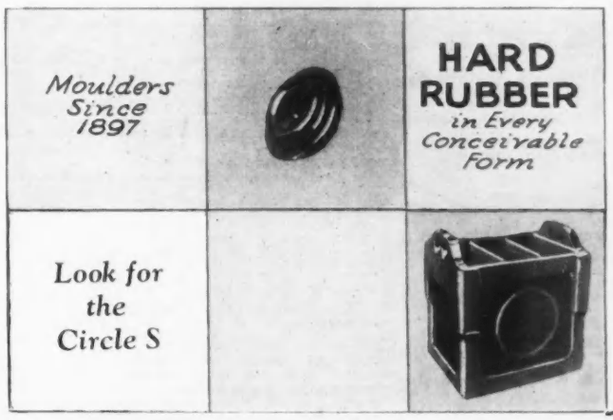
Jos. Stokes RUBBER CO.
Trenton N.J.
Canadian Plant, Welland, Ontario

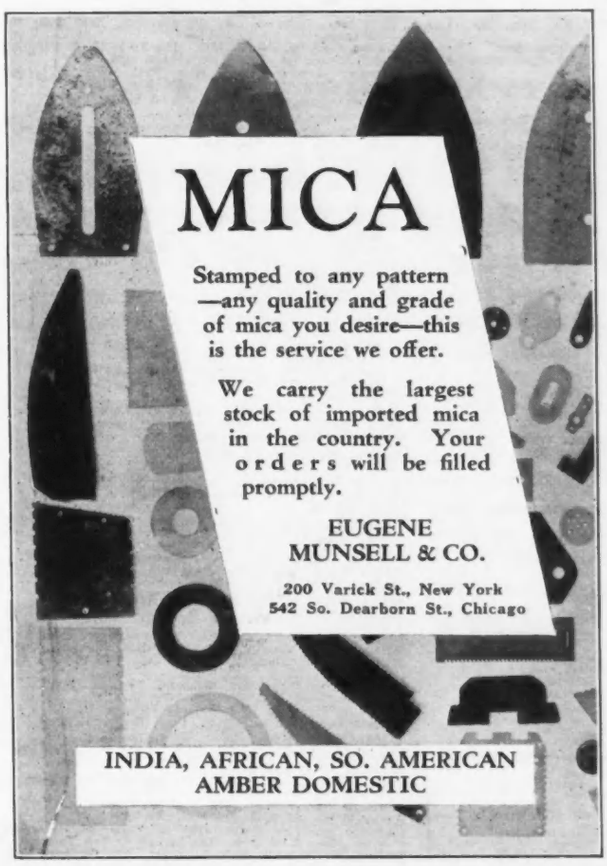
Following the ideals of the pioneer, this company has ever been in the lead in meeting the needs of the electrical industry with Plastics and Hard Rubber that stand the test of Service.

Your problem is a challenge to our engineering skill. Let us work it out for you.

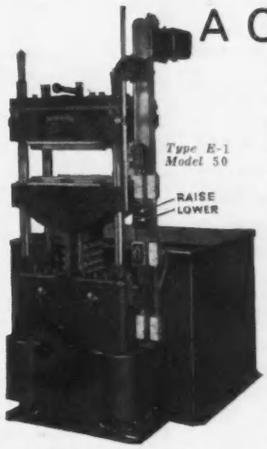
The Mark (S) of Quality

NATIONALLY ADVERTISED




MICA
Stamped to any pattern —any quality and grade of mica you desire—this is the service we offer.
We carry the largest stock of imported mica in the country. Your orders will be filled promptly.
EUGENE MUNSELL & CO.
200 Varick St., New York
542 So. Dearborn St., Chicago
INDIA, AFRICAN, SO. AMERICAN
AMBER DOMESTIC

A COMPLETE MOLDING UNIT . . . in your own plant!



Our bulletin entitled "Synthetic Hot Moulding" will be of interest to all plant executives who wish high quality but low cost moulding.

Why go outside and pay more money for your molded parts when you can do all the work in *your own plant* under your own supervision? The **ELECTRO-DRAULIC** molding press is built for just this purpose —a *complete* unit.

Besides, you control and use your own molds—no shipping and re-shipping.

The ELECTRO-DRAULIC molding press is not complicated. An inexperienced operator can handle it, and no other accessories are necessary.

TERKELSEN MACHINE COMPANY
Terkelsen Building
BOSTON, MASS., U. S. A.

1. Air Heaters
2. Automatic Motor Starters.
3. D. C. Battery Charging Equipment.
4. Field Rheostats.
5. Laboratory Resistors and Rheostats.
6. Motor Starters and Controllers A. C. and D. C.
7. Radio Resistors and Rheostats.
8. Resistors for all purposes.
9. Rheostats for all purposes.
10. Speed Controllers.
11. Theatre Dimmers.

WARD LEONARD ELECTRIC CO.
31-41 South St. Mount Vernon, N. Y.

CLOTH & PAPER—Continued
Manhattan Paper Co., J. A., Troy, N. Y. B
Mica Insulator Co., 200 Varick, New York C S P B
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y. C S P F B
National Vulcanized Fibre Co., Wilmington, Del. F
New Jersey Wood Finishing Co., Woodbridge, N. J. C
Ohmoid. See Wilmington Fibre Specialty Co.
Old Hick. See Hewitt & Bros., C. B.
Peerless. See National Vulcanized Fibre Co.
Riegels. See Warren Mfg. Co.
Rogers Paper Mfg. Co., So. Manchester, Conn. B
schweitzer, Inc., Peter J., 200 Fifth Ave. New York, N. Y. (Condenser Tissue.)
Sico. See Standard Insulation Co
Spaulding Fibre Co., Tonawanda, N. Y. F
Standard Insulation Co., East Rutherford, N. J. C S P
Sterling Fireboard Co., 501 Fifth Ave., New York. (Varied Hard Fireboard) B
Sterlite. See Sterling Firebrand Co.
Stevens Paper Mills, Windsor, Conn. B
Tarentum Paper Mills Co., Tarentum, Pa. P
Turbonite. See Brand & Co., Wm.
Union Mills Paper Mfg. Co., New Hope, Pa. P
Warren Mfg. Co., 342 Madison Ave., New York, N. Y. P
West Virginia Pulp & Paper Co., 230 Park Ave., New York B
Wilmington Fibre Specialty Co., Wilmington, Del. P

CLUTCHES, Magnetic

Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee, Wis

COIL (Coils).

Armature and Field. See Coils, Finished.
Choke (Radio). See Radio Circuit Components
Driers & Impregnators. See Ovens.
Electromagnet. See Coils, Finished.
Flatteners. See Rolls. Coil Flattening.
High Frequency. See Electro-Therapeutic; also Radio Circuit Components; also Ignition Outfits.
Impregnators, Vacuum. See Ovens, Industrial
Induction. See Coils, Finished; also Electro-Therapeutic
Loop Benders. See Benders, Coil Loop.
Medical. See Electro-Therapeutic.
Presses. See Presses, Armature Coil.
Radio. See Radio Circuit Components.
Removers. See Removers, Coil.
Resistance. See Units, Rods & Grids; also Radio Circuit Components.
Shaping Machines. See Shaping Machines, Coil
Spark. See Ignition Outfits.
Spreaders. See Winding Machines, Armature and Field.
Tamping Tools. See Tools, Coil Tamping.
Taping Machines. See Taping Machines Coil
Testers. See Testers, Coil; also Test Benches, Armature
Winders, Armature & Field Coil. See Winding Machines. Armature & Field Coil.
Winders, Induction Coil. See Winding Machines, Industrial Coil.
Winding Forms. See Forms, Coil Winding.
Windings (Magneto). See Coils, Finished.
Wire Tension Devices. See Tension Devices, Coil Wire.

COILS, Finished

Armature, Field, Electromagnet and Induction Coils.
Acme Products Co., Boston, Mass.
Anderson & Co., C. J., 213 W. Austin Ave., Chicago, Ill.
Acme Wire Co., New Haven, Conn.
Aero Products, Inc., 4611 Ravenswood Ave., Chicago, Ill.
Armature Co., 7500 Stanton, Cleveland, Ohio
Auth Electrical Specialty Co., 422 E. 53rd St., New York.
A. & A. See Electrical Coil Winding Co.
Belden Mfg. Co., 4631 W. Van Buren, Chicago, Ill.
Bunnell & Co., J. H., 32 Park Place, New York, N. Y
Burke Controller Co., 360 Lexington Ave., New York, N. Y.
Cancourse (Electric Co., 394 E. 137th, New York, N. Y.
Cote Coil Div. of Universal Winding Co., Providence, R. I.
Ditmar Elec. Co., Brookline, Mass.
Dudlo Mfg. Co., Div. of General Cable Corp., Fort Wayne.
Easton Coil Co., Easton, Pa.
Electric Heat Control Co., 5902 Carnegie Ave., Cleveland, O.
Electric Valve Mfg. Co., 64 Murray, New York, N. Y.
Electrical Coil Winding Co., 2735 Saunders, Camden, N. J.
Fredericks Co., H. M., 1315 S. Wabash Ave., Chicago, Ill.
Globe Technolian Corp., Reading, Mass.
Herald Electric Co., 29 East End Ave., New York, N. Y.
Ideal Mfg. Co., Fort Wayne, Ind.
Marion Elec. Mfg. Co., 24 Cliff, Jersey City, N. J
National Elec. Corp., 236 High, Newark, N. J
Palmer Corp., Chas., 750 Broad, Newark, N. J. (Solenoids.)
Pifer Elec. Repair & Mfg. Co., 3410 Superior Ave., Cleveland, O.
Polymet Mfg. Co., 829 E. 134th St., New York, N. Y
Power Transformer Co., 145 W. 22nd, New York, N. Y.
Reisner Mfg. Co., W. H., Hagerstown, Md.
Robertson-Davis Co., 363 W. Superior, Chicago, Ill.
Robertson, Lee F., Inc., 532 West 22nd St., New York.
Rome Wire Co. (Div of General Cable Corp.), Rome, N. Y
Slotting Co., 10 New York Ave., Hartford, Conn.
Stums & Barron, 210 E. Pratt, Baltimore, Md.
Toledo Standard Commutator Co. 1242 Smead Ave., Toledo, O.
Universal Armature Corp., Cambridge, Mass.
Varley Duplex Magnet Co., 15 Exchange Place, Jersey City N. J. (Electromagnetic only).
Wells Mfg. Co., Fond du Lac, Wis.

COMMUTATOR

Bars. See Bars, Commutator.
Cement. See Cement, Commutator.
Dressers. See Stones, Commutator.
Lubricants. See Compounds, Commutator.
New. See Commutators.
Refilled. See Repairing and Second Hand.
Slotters. See Slotting Machines & Tools, Commutator.
Slotting Files. See Files, Commutator Slotting.
Soldering Machines. See Soldering Machines, Commutator
Stones. See Stones, Commutator.
Tighteners. See Tighteners, Commutator.
Truing Devices. See Tools, Commutator Truing.

COMMUTATORS

Armature Co., 7500 Stanton Ave., Cleveland, Ohio.
Cameron Electric Mfg. Co., Ansonia, Conn.
Cleveland Commutator Co., 1382 E. 55th, Cleveland, O.
Derby Commutator Co., Derby, Conn.
Electric Materials Co., North East, Pa.
Eureka Metal Products Corp., 2210 Elmwood Ave., Buffalo, N. Y.
Homer Commutator Co., 4748 Hough Ave., Cleveland.
Toledo Standard Commutator Co., Toledo, O.

COMMUTATOR BRUSHES. See Brushes, Commutator.
COMPOSITION PULLEYS. See Pulleys, Composition.

COMPOUNDS, Commutator

Allen Co., Inc., L. B., 6752 Bryn Mawr Ave., Chicago, Ill.
Armstrong. See Elec. Power Maintenance.
Chicago Solder Co., 4201 Wrightwood Ave., Chicago, Ill.
Consistency. See Warren Lubricant Co.
Cramolin, Inc., 25 W. 43rd St., New York, N. Y.
Dixon Crucible Co., Jos., Jersey City, N. J.
Doe & Co., Walter S., Kent, Ohio.
Gales. See McLennan & Co.
Goldmark Co., James, 83 Warren, New York, N. Y.
Kester Solder Co., 4210 Wrightwood Ave., Chicago, Ill.
McLennan & Co., K., 1751 West 35th, Chicago.
Perfection. See Warren Lubricant Co.
Sanderson. See Warren Lubricant Co.
Spermo. See Warren Lubricant Co.
Trotters. See Goldmark Co., James.
Warren Lubricant Co., 22 Maurice, Buffalo, N. Y.

COMPOUNDS, Sealing. See Wax and Compounds.

CONDENSER UNITS, Refrigerator

Bush Mfg. Co., Hartford, Conn.
McCord Radiator & Mfg. Co., Richelle & E. Grand Ave., Detroit, Mich.
Roane-Turney Radiator Co., Rome, N. Y.
Wolverine Tube Co., 1431 Central Ave., Detroit, Mich.

CONDENSER, Electric

Sevison Magneto Engineering Co., 379 Phillips Ave., Toledo,

CONDENSERS, Radio. See Radio Circuit Components.
CONDENSER TUBING. See Tubing, Brass and Copper

CONNECTORS, Pin-Plug

Kliegl Bros. Universal Electric Stage Ltg. Co., 321 W 50th, New York, N. Y.

CONNECTORS, Wire

Ideal Commutator Dresser Co., 1039 Park Ave., Sycamore, Ill. (Solderless-Tapeless).

CONTACT POINTS. See Points, Contact.
CONTAINERS, Shipping. See Fibre Board Products.

CONTROLLERS, Motor

Aclinestor See Sundh Elec. Co.
Allen-Bradley Co., 493 Clinton, Milwaukee, Wis.
Anderson & Co., C. J., 213 W. Austin Ave., Chicago, Ill.
Automatic Switch Co., 154 Grand, New York, N. Y.
Betts, Inc., James H., 1393 Sedgwick Ave., New York, N. Y. (Traffic.)
Burke Controller Co., 360 Lexington Ave., New York, N. Y.
C-Q Oil Burner Co., Stockton, Cal.
Clark Controller Co., 1146 E. 152nd, Cleveland, O.
Condit Elec'l Mfg. Corp., 838 Summer St. (South Boston, Mass.
Cutler-Hammer Mfg. Co., 1288 St. Paul Ave., Milwaukee.
Diamond Elecl. Mfg. Co., 1330 N. 16th, Los Angeles, Cal.
Dinkey. See Elec. Controller & Mfg. Co.
Dunco. See Struthers Dunn, Inc.
E C & M Youngstown. See Electric Controller & Mfg. Co.
Electric Controller & Mfg. Co., 2700 E. 79th, Cleveland, O.
Electrite. See Sundh Elec. Co.
Hercules. See Union Elec. Mfg. Co.
General Electric Co., Schenectady, N. Y.
Horni Signal Mfg. Corp., 515 Greenwich, New York.
Industrial Controller Div. of Square D Co., S. Pierce & Hanover Sts., Milwaukee, Wis.
Maimin Speed Control Corp., 251 W. 19th, New York. (Sewing Machines.)
Monitor Controller Co., 51 Gay, Baltimore, Md.
National Electric Controller Co., 5315 Ravenswood Ave., Chicago, Ill.
Refrigerating Specialties Co., 728 S. Sacramento Blvd., Chicago, Ill.
Resisto. See Allen-Bradley Co.
Rowan Controller Co., 306 N. Holliday, Baltimore, Md
Square D Co., 6060 Rivard, Detroit, Mich.
Struthers Dunn, Inc., 138 N. Juniper, Philadelphia, Pa.
Sundh Elec. Co., 209 Parkhurst, Newark, N. J.
Switchelone. See Condit Elec. Mfg. Co.
Thermaload. See Monitor Controller Co.
Trumbull Electric Mfg. Co., Plainville, Conn
Ward Leonard Elec. Co., 31 South, Mount Vernon, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
W. K. See Westinghouse Elec. & Mfg. Co.
Wright. See Electric Controller & Mfg. Co.

COPPER. See Brass, Bronze and Copper; also Castings
COPPER TUBING. See Tubing, Brass and Copper
CORD TIPS. See Tips, Cord.
CORD, Tinsel. See Tinsel Cord & Thread.

CORDS, Extension

Stupakoff Laboratories, 6627 Hamilton Ave., Pittsburgh, Pa.

CORES, RESISTANCE COIL (Lava)

American Lava Corp., 1425 William, Chattanooga, Tenn.
Crescent. See M. Kirchberger & Co.
Ee-El-Co. See Southern Lava Co.
Kirchberger & Co., M., 1425 37th, Brooklyn, N. Y
Lavite. See Steward Mfg. Co.
Lavarock. See M. Kirchberger & Co.
Southern Lava Co., Rossville, Ga.
Steward Mfg. Co., D. M., Chattanooga, Tenn.
Tennessee Burner Mfg. Co., Chattanooga, Tenn.
XL. See Tennessee Burner Mfg. Co.

CORES, RESISTANCE COIL (Refractory Porcelain)

American Lava Corp., 1425 William, Chattanooga, Tenn.
Colonial Insulator Co., Akron, O.
Crowley & Co., Henry L., 1 Central Ave., West Orange, N. J.
Electrical Refractories Co., East Palestine, O
Elemite. See Louthan Mfg. Co.
Fireite. See Hartford Faience Co.
Hartford Faience Co., Hartford, Conn.
Louthan Mfg. Co., E. Liverpool, O.
Stupakoff Laboratories, 6627 Hamilton Ave., Pittsburgh, Pa.
Thermal Syndicate, 58 Schenectady Ave., Brooklyn, N. Y
Vitrefail. See Thermal Syndicate.
Woolley, Inc., W. Douglas, East Liverpool, O.

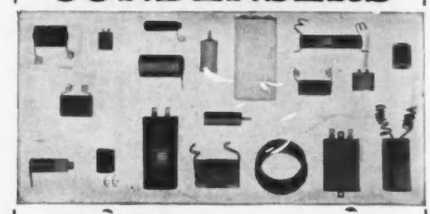
COTTON DUCK. See Cloth, Untreated.
COTTON SLEEVING. See Tape, Cotton.
COUNTERS, Revolution. See Tachometers.

COUPLINGS, Shaft (Flexible-Insulated)

Ajax Flexible Coupling Co., Westfield, N. Y.
Bartlett Hayward Co., Baltimore, Md.

COILS
Electrical Windings of all Kinds
Let our engineers help you
ROBERTSON-DAVIS CO.
363 W. Superior St. Chicago, Ill.

CONDENSERS



Sevison Magneto Engineering Co.
379-401 Phillips Ave. Toledo, Ohio

Bond Co., Charles, 617 Arch, Philadelphia, Pa.
Brown Engineering Co., 123 N. Third, Reading, Pa.
Falk Corp., Milwaukee, Wis.
Delbee Rubber Co., Syracuse, N. Y.
Francke. See Smith & Serrell.
General Electric Co., Schenectady, N. Y.
Grundy. See Bond Co.
Hill Clutch Machine & Foundry Co., 6400 Breakwater Ave., Cleveland, Ohio.
Kantl Lever. See Brown Engineering Co.
Krone-Seebek Die Casting & Mfg. Co., 2935 W. 47th, Chicago, Ill.
Lipe, W. C., Syracuse, N. Y.
Lovejoy Tool Wks., 325 W. Ohio, Chicago, Ill.
LR. See Lovejoy Tool Wks.
Mather. See Bond Co.
Nuttall Wks., of Westinghouse Elec. & Mfg. Co., McCandless Ave. & Harrison St., Pittsburgh, Pa.
Oneida. See Dalluse Rubber Co.
Smith & Serrell, 5 Halsey, Newark, N. J.
Webster Mfg. Co., 1856 N. Kostner Ave., Chicago, Ill.
Wood's Sons Co., T. B., Chambersburg, Pa.

COVERING MACHINES, WIRE. See Wire Manufacturing Machines.

COVERS, Paper and Fabric

For Lamp Shades, Paper & Fabric, Fans, Radio & Appliances.
Adjusto. See Phoenix Import Co.
Arkel Safety Bag Co., 10 E. 40th St., New York, N. Y. (For Motors, Fans, Lamp Shades.)
Boyle Co., John, 121 Duane, New York, N. Y. (Fan.)
Droutman Mfg. Co., 36 W. 60th, New York, N. Y.
Empire Shield Co., 590 Broadway, New York, N. Y.
Kennedy Car Liner & Bag Co., Shelbyville, Ind.
Lansing Sales Co., 24 Harvard, Boston, Mass.
La Rosa Mfg. Co., 757 Sixth Ave., New York, N. Y. (Rubberized Fan.)
Phoenix Import Co., 45 E. 25th, New York, N. Y. (Shade.)
Superb. See Droutman Mfg. Co.
Superior. See Empire Shield Co.

CRUCIBLES, Porcelain. See Porcelain.

CRANES, Floor. See Lifts, Armature.

CRYSTALS, Chandelier

Crystals, Prisms, Beads, Chains, Fringes.
Crystal Venezia. See Harrison & Co., Arthur.
Foslite. See Harrison & Co., Arthur.
Friedlaender Co., 49 W. 23rd, New York, N. Y.
Harrison & Co., Arthur, 561 W. Washington Blvd., Chicago.
Hirschberg, Shutz & Co., 268 4th Ave., New York, N. Y (Fringes.)
Nelson Bead Co., 15 W. 37th, New York, N. Y. (Importer.)
Rialto Import Co., 112 W. 4th, New York, N. Y.
Schwartz Lighting Fixture Wks., 1341 Noble, Philadelphia
Wyle & Bros., J. J., 20 E. 27th, New York, N. Y.

CUPS, Grease

Bowen Products Corp., Auburn, New York.
Gits Bros. Mfg. Co., 1940 S. Kilbourn Ave., Chicago, Ill.
Lunkenheimer Co., Cincinnati, Ohio.

CUPS, Oil

Gits Bros. Mfg. Co., 1940 S. Kilbourn Ave., Chicago, Ill.
Tucker, Inc., W. W. & C. F., 618 Capital Ave., Hartford, Conn.

CUT OUTS, Battery. See Switches, Battery.
CUTTING OUTFITS, Metal. See Welding and Cutting Outfits.
CURRENT INDICATORS. See Instruments, Pocket.
DASHBOARD METERS. See Instruments, Portable and Switchboard.

DECALCOMANIA

Meyercord Co., Chicago, Ill.
Novar. See Palm Fechteler & Co.
Palm Fechteler & Co., 67 5th Ave., New York, N. Y

DIALS

Radio (Metal). See Radio Mountings
Radio (Molded). See Radio Molded Parts
Enameled. See Dials, Enameled.

DIALS, Enameled

Whittier Co., Horace R., Pequabuck, Conn.

DIAPHRAGM, Cloth. See Cloth, Untreated.
DIE CASTINGS. See Castings, Die.

DIE CASTING MACHINES

Allied Die Casting Corp., Long Island City, N. Y.
Madison-Kipp Corp., 211 Waubesa, Madison, Wisc.

DIE MAKERS. See Dies, Die Makers.

DIE SETS

Baumbach Mfg. Co., 1810 Kilbourn Ave., Chicago, Ill.
Danly Machine Specialties, Inc., 2104 S. 52nd Ave., Chicago, Ill.
Diamant Tool & Mfg. Co., 401 Mulberry, Newark, N. J.

DIES, Pipe. See Stocks, Dies and Reamers

DIES, DIE MAKERS

Beaver Mfg. Co., 625 N. Third, Newark, N. J
Caldbeck Tool & Mfg. Co., 307 East Third, Des Moines, Iowa.
Chicago Molded Products Co., 2148 Walnut, Chicago, Ill.
Eureka Tool & Machine Co., 42 Walnut, Newark, N. J.
Kuhn & Jacob Machine & Tool Co., 502 Prospect Ave., Trenton, N. J.
Madison-Kipp Corp., 211 Waubesa, Madison, Wis.
Mareck & Nebel, 255 Greenwich, New York, N. Y.
Plymouth Mfg. Co., 2148 Walnut, Chicago, Ill.
Stein & Co., Wm. P., 424 St. Paul, Rochester, N. Y.

DIMMER, Theatre

Ward Leonard Elec. Co., 31 South, Mount Vernon, N. Y.

DISCS, Armature

Steel Discs, Laminations, and Segments for Motors and Transformers.
American Stamping Co., 978 E. 64th, Cleveland, O.
Armature Co., 7500 Stanton Ave., Cleveland, O.
Cleveland Armature Works, 4732 St. Clair Ave., Cleveland
Hercules Elec. Steel Corp., 145 Lafayette, New York, N. Y
Johnson, H. D., 170 Mahncke Court, San Antonio, Texas
Lamination Stamping Co., 764 Windsor, Hartford, Conn.
Niagara Machine & Tool Wks., 637 Northland, Buffalo

PROPERLY MOULDED BAKELITE PARTS

insure absolute accuracy and exact uniformity in your product. They save time in assembling, eliminate expensive machining operations and lower your manufacturing costs. They require neither buffing nor polishing, yet have a fine and lasting finish—in colors if desired. Their tensile and dielectric strength is high—they are unaffected by moisture, oils and most acids. Ours is the largest plant in the Middle West devoted exclusively to the manufacture of moulds and custom moulding of Bakelite parts.

Write for our catalog.

Chicago Moulded Products Corp.

2144 Walnut Street :: Chicago, Illinois

Subsidiary to Plymouth M'f'g Co.

To the Manufacturer

YOUR FINISHED PRODUCT

is given the final touch when protected with a

KENNEDY PAPER PACKING BAG

In addition to the efficient dust and dirt protection obtained, these bags effect a saving in labor and material in your packing department as well as accomplish a better job of wrapping than by the use of sheet paper.

KENNEDY PAPER PACKING BAGS are tailor made to meet each manufacturer's peculiar requirements—bags for electrical equipment, machinery, tools, accessories, as well as household appliances, in fact a bag for about any item that requires dust, dirt or moisture protection.

EXPORT. We also make covers and case liners for export shipments using such paper stock best adapted for protection during ocean voyage.

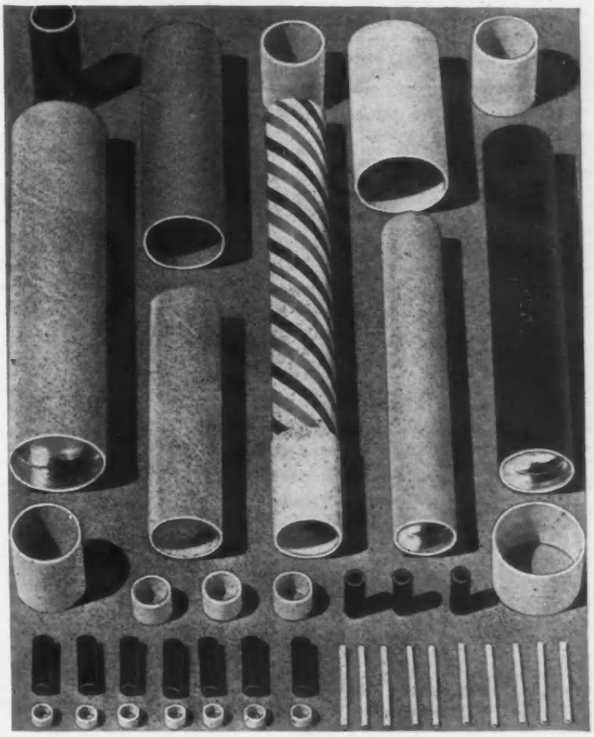
We have a bag for your product. Inquiries invited for samples: no charge

THE KENNEDY CAR LINER & BAG COMPANY

Shelbyville, Indiana

Canadian Factory at Woodstock, Ontario

STONE'S PAPER TUBES



Save Time and Trouble in Electrical Work

• Send Coupon for Samples •

MANY leading electrical manufacturers are saving time, trouble and labor through the use of Stone's Paper Tubes. Use them for *insulation shields* to prevent contact between the wiring and shafts of armatures; for *insulation sleeves* to slip over spliced wires; for *coil form supports*. Protect armature shafts, threaded shaft ends, etc., against paint or varnish when spraying, brushing or dipping adjoining parts. These are just a few of the many uses for Stone's Paper Tubes.

We make an infinite variety of sizes (up to one-inch diameter), colors and coatings in open and closed end tubes with various degrees of wall thickness. Large production, specially designed machines, and forty years' experience enable us to serve you promptly and economically. Send coupon for samples and practical suggestions.

MAIL THIS FOR FREE SAMPLES

STONE PAPER TUBE CO.
Washington, D. C.

Please send us free samples of Stone's Paper Tubes and list of helpful uses.

Name of company .....

Address .....

City ..... *State* .....

FELT

Wicks for Motors
Lining for Fan Bases
Lining for Lamp Bases
Packing for Radio Trade

WESTERN FELT WORKS

4029-4133 Ogden Ave., Chicago
NEW YORK DETROIT CLEVELAND ST. LOUIS

ELECTRO
MAGNETS
FOR
ANY REQUIREMENT

For A. C. and D. C. Special Magnet to Suit Your Job

Solenoids Electrically Operated Valves Remote Control Switches Emergency Sw. Door Switches

ELECTRIC VALVE MFG. CO.
64 Murray St., New York, N. Y.

FIBRE—*cut to any form*
Sheet, Rod, Tubing
MICA
VARNISHED CLOTH
COTTON TAPES AND SLEEVING
Everything for the Motor
Send for New Insulation Catalogue
THE CONSUMERS RUBBER CO.
CLEVELAND 1302-4-6 Ontario St.
CHICAGO 217 North Desplaines St.

DISCS, Armature—Continued
Valley Appliances, Inc., 634 Lexington Ave., Rochester N. Y.
Willor Mfg. Corp., 117 Mercer, New York, N. Y.
DRAWING MACHINES, WIRE. See Wire Drawing Mach.
DRIVE SCREWS. See Screws, Drive.
DRIVES, CHAIN. See Chain, Power Transmission.

DYNAMOMETERS

Clark Controller Co., 1146 E. 152nd, Cleveland, O.
Diehl Mfg. Co., Elizabeth, N. J.
General Electric Co., Schenectady
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
EBONITE. See Rubber, Hard.
ELECTROLYTE. See Chemicals, Battery.
ELECTROMAGNETS. See Coils, Finished.

ELECTRODES FOR GAS SIGNS

American Neon Sign Corp., 549 W. 152nd St., New York.
American Sign Co., Cincinnati, Ohio.
Eisler Electric Corp., 770 S. 13th St., Newark, N. J.
Q. R. S. De Vry Corp., 333 N. Michigan Ave., Chicago.
ELECTRODYNAMOMETERS. See Instruments, Laboratory Standard.

ELECTRO MAGNETS

Varley Duplex Magnet Co., 15 Exchange Pl., Jersey City, N. J.
ELEMENTS, Heating. See Units, Rods and Grids.

ENAMELING MACHINES (For Magnet Wire)

(See Also Wire Manufacturing Machines).
American Insulating Machinery Co., 519 Huntington Ave., Philadelphia, Pa.
Sleeper & Hartley, Inc., 335 Chandler, Worcester, Mass

ENGRAVING MACHINES

Portable Bench and Pedestal Outfits for Marking Metal.
Brewster Co., Wm., 30 Church, New York, N. Y.
Deckel, See Preis & Co., Inc. H. P
Eisler Electric Corp., 770 S. 13th, Newark, N. J.
(Tube Base Branders)
Engravograph Corp., 12 Vestry, New York, N. Y.
Etchograph. See Brewster Co., Wm.
Gilbert Supply Co., Independence, Iowa.
Gorton Machine Co., Geo Racine, Wis.
Luma Elec. Equipment Co., Toledo, O.
Preis & Co., Inc., H. P. 227 Fulton, New York, N. Y.
Schmidt, Inc., Geo. T. 4102 Ravenswood Ave., Chicago, Ill.
Simplex Tool Co., Woonsocket, R. I.

ENGRAVING, Radio Panel

Engraving to Order.
Eastern Specialty Co., 3551 N. Fifth, Philadelphia, Pa.
Etch-O-Gravure. See Insuline Corp. of America.
General Fabricating Co., 165 Greenwich, New York, N. Y.
Globe Mfg. Co., 101 Spokane St., Seattle, Wash.
Insuline Corp. of America, 78 Cortlandt, New York, N. Y.
Mechanical Engraving Co., 130 Orchard, Newark, N. J.
New England Products Co., 232 Greenwich, New York.
Preis & Co., Inc., H. P., 227 Fulton, New York, N. Y.
Schmidt, Inc., Geo. T., 4102 Ravenswood Ave., Chicago, Ill. (Tube Base Branders).
Schwenks Machine Engraving Co., 2058 Woodward Ave., Detroit, Mich.
Varnishwax Laboratories, 4614 Spring Grove Ave., Cincinnati
Wright Radio Co., 114 Exchange, Rockland, Mass.

EYELETS

Monowatt Electric Corp., 24 W. 40th, New York, N. Y.
Platt Bros. & Co., Waterbury, Conn.
Waterbury Button Co. (Elecl. Mfg. Dept.), Waterbury, Conn.
FABRIC, Radio Grill. See Cloth, Untreated.
FABRIC SHADES. See Shades, Fabric.
FAN BLADES. See Blades, Fan
FAN GUARDS. See Forms, Wire.

FEET, Felt

Brawley Felt Co., Inc., T. R., 279 20th, Brooklyn, N. Y.
Mattatuck Mfg. Co., Waterbury, Conn.

FELT

American Felt & Cutting Co., 609 W. Lake, Chicago, Ill.
American Felt Co., 315 Fourth Ave., New York, N. Y.
Booth Felt Co. 469 18th, Brooklyn, N. Y.
Brawley Felt Co., Inc., T. R., 279 20th, Brooklyn, N. Y.
Western Felt Wks., 4029 Ogden Ave., Chicago, Ill.

FERRULES

Aluminum Co. of America, 2444 Oliver Bldg., Pittsburgh.
Chase Brass & Copper Co., Waterbury, Conn.
Clark Metal Products, 490 Hancock Ave., Bridgeport, Conn.
Grammes & Sons, Inc., L. F., Allentown, Pa.
Massachusetts Machine Shop, Inc., Boston Mass
Monowatt Elec. Corp., 2 W. 40th, New York, N. Y.
Patton-MacGuyer Co., Providence, R. I.
Platt Bros. & Co., Waterbury, Conn.
Risdon Mfg. Co., Naugatuck, Conn.
Scovill Mfg. Co., 99 Mill, Waterbury, Conn.
Waterbury Brass Goods Corp., Waterbury, Conn
Waterbury Button Co. (Elecl. Mfg. Dept.), Waterbury, Conn.

FIBRE BOARD PRODUCTS (Solid and Corrugated)

Container Corp. of America, 111 W. Washington, Chicago. Chicago, Ill.
Mid-West Box Co., 111 W. Washington, Chicago.
FIBER CANDLES. See Candles, Fixture.
FIBRE GEARS. See Gears and Pinions, Composition.
Paper. See Cloth and Paper.
Radio Panels. See Radio Molded Parts.
Shipping Containers. See Fibre Board Products.
Vulcanized. See Fibre, Vulcanized.

FIBRE, Phenol

Moisture Proof: Sheet, Rod, Tubes.
Aico. See American Insulator Corp.
Amerine. See American Insulator Corp.
Armite. See Spaulding Fibre Co.
Bakelite-Dilecto. See Continental Fibre Co.
Continental-Diamond Fibre Co., Bridgeport, Pa.
Electrical Insulation Corp., 308 W. Washington, Chicago, Ill.
Fibroe Insulation Co., 245 Lincoln Ave., Valparaiso, Ind.

Formica Insulation Co., 4638 Spring Grove Ave., Cincinnati, O.
Franklin Fibre Specialty Co., Wilmington, Del
Laminated Phenol, Inc., 1223 S. Western Ave., Chicago, Ill.
Micarta. See Westinghouse Elec. & Mfg. Co.
National Vulcanized Fibre Co., Wilmington, Del.
Phenolite. See National Vulcanized Fibre Co.
Spaulding Fibre Co., Tonawanda, N. Y.
Synthane Corp., Oaks, Pa.
Textolite. See Electrical Insulation Corp.
Val-Cot. See National Vulcanized Fibre Co.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

FIBRE, Vulcanized

Sheet, Rod, Tube, Horn, Fibre, Bushings, Washers, Cleats, Screw Machine Products.
Brandywine Fibre Products Co., 1402 Walnut St., Wilmington, Del.
Conite. See Continental-Diamond Fibre Co.
Continental-Diamond Fibre Co., Bridgeport, Pa
Delaware Hard Fibre Co., Box 970M, Wilmington, Del.
Egyptian. See Delaware Hard Fibre Co.
Electrosote. See Pantasote Co.
Fibre Products Co., New Bedford, Mass.
Franklin Fibre Specialty Co., Wilmington, Del.
Fyberoid. See Wilmington Fibre Specialty Co.
Independent Laboratories, 50 E. 42nd, New York. N. Y
Insuline Corp. of America, 78 Cortlandt, New York, N. Y.
Iten Fibre Co., 5402 Bower Ave., Cleveland, O.
Lincoln Fibre & Specialty Co., Newport, Del.
National Vulcanized Fibre Co., Wilmington, Del
Ohmoid. See Wilmington Fibre Specialty Co.
Pantasote Co., Inc., 250 Park Ave., New York, N. Y.
Peerless. See National Vulcanized Fibre Co.
Spaulding Fibre Co., Tonawanda, N. Y.
Standard Fibre Products Co., 36 Pleasant, Watertown, Mass
Val-Cot. See National Vulcanized Fibre Co.
Vulcawood. See Continental-Diamond Fibre Co.
Wilmington Fibre Specialty Co., Wilmington, Del.
FIBRE WASHERS. See Fibre.
FIELD COILS. See Coils, Finished.

FILAMENTS, Incandescent Lamp

Cohn, Sigmund, 44 Gold, New York, N. Y.
Eisler Electric Corp., 770 S. 13th St., Newark, N. J.
Filament Supply Co., 1317 Willow Ave., Hoboken, N. J.
Gilby Wire Co., Riverside Ave., Newark, N. J.
National-Harris Wire Co., Newark, N. J.
Nuetzi, Jul. N., 349 16th, Milwaukee, Wis.
Pierce Mfg. Co., 625 W. Jackson Blvd., Chicago, Ill.
Radio Products Corp., Steneck Trust Bldg., Hoboken, N. J
Volkmer Radio Products Corp., 187 Sylvan Ave., Newark, N. J. (Lead-in-Welds.)
Welcon Industries, Inc., Exton Ave. & Buch, North Arlington, N. J. (Lead-in Welds.)

FILES, Commutator Slotting

Ideal Commutator Dresser Co., 1039 Park, Sycamore, Ill.
Martindale Electric Co., 1262 W. Fourth, Cleveland, O.
FISH PAPER. See Cloth and Paper.
FITTINGS, Fixture. See Fixture Fittings.
FIXTURE CANDLES. See Candles, Fixture.
FIXTURE CHAIN. See Chain, Fixture.
FIXTURE, Collars. See Fixture Fittings.

FIXTURE FITTINGS

	KEY
Bowl Holders	See B
Brass Fittings	See B
Canopies	See B
Collars	See B
Crow Feet	See I
Finials (Brass, Glass and Porcelain)	See B
Hangers	See H
Hickies, Brass	See B
Hickies, Iron	See I
Hooks, Brass	See B
Hooks, Iron	See I
Iron Fittings	See I
Loops, Brass	See B
Loops, Iron	See I
Rings	See B
Shade Holders	See S
Shells	See B
Spinnings	See B
Stampings	See B
Stems	See B
Straps	See H
Studs	See I

Acme Lighting Products, Inc., 2114 Woodland Ave., Cleveland, O. Straps . . . . . H
American Chain Co., Bridgeport, Conn. (Loops and Rings.) . . . . . B . . . . .
American Ring Co., Waterbury, Conn. (Candles) . . . . S . .
Appleton Electric Co., 1703 Wellington Ave., Chicago, Ill. . . . . B I . . .
Arco. See American Ring Co.
Arrow Electric Division of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn. . . . . S . .
Artoloid. See Great Eastern Brass Wks., Inc.
Art Metal Co., 3721 Dayton, Cleveland, O. . . . . H
Banlite. See East Side Metal Spinning Co.
Banner. See Plume & Atwood Mfg. Co.
Barton Brass Wks., 3637 Superior, Detroit.. B . . . . .
Belmet. See B. & L. Metal Stamping Co.
Bloch Bros., 88 Walker, New York. . . . . B . . . . .
Brandt Mfg Co., 3727 Gratiot Ave., Detroit B . . . . .
Braun, J. G., 609 S. Paulina, Chicago, Ill. (Pressed Ornaments.) . . . . . B I . .
Bryant Elec. Co., 1421 State, Bridgeport, Conn. . . . . S . .
B. & L. Metal Stamping Co., 250 Moore, Brooklyn, N. Y. (Also Combination Wall Bracket Hanger.) . . . . . B I . . H
Cambridge Brass Co., Cambridge, Mass. . . . . B . . . . .
Chase Brass & Copper Co., Waterbury, Conn. B . . S . .
Chatham Metal Spinning & Stamping Corp., 128 Mott, New York, N. Y. . . . . B I . . .
Cleaneze. See Dunlap Co.
Colonial Stamping Co., Brill St. & Passaic Ave., Newark, N. J. . . . . B . . S . .
Crescent Brass Mfg. Co., Reading, Pa. . . . . B . . . . .

Crouse-Hinds, Solvay Sta., Syracuse, N. Y. . . . . S H
Diamond Needle & Mfg. Co., Torrington, Conn. (Hickies.) . . . . . I . . .
Dunlap Co., John, Carnegie, Pa. . . . . S . .
East Side Metal Spinning Co., 451 Greenwich, New York, N. Y. . . . . B . . . . .
Eureka Tin Ware Mfg. Co., 135 W. 20th, New York, N. Y. . . . . S . .
E-Z Up. See Plume & Atwood Mfg. Co.
Faries Mfg. Co., Decatur, Ill. . . . . B I S H
Fixturelite Mfg. Co., 488 W. Broadway, New York, N. Y. . . . . B . . . H
Flaherty Co., M. E., 28 S. Clinton, Chicago. . . I . . .
Fralick Co., S. R., 15 S. Clinton, Chicago. . . I . . .
Franklin Brass Foundry Co., Reading, Pa. . . . B . . . .
Friedley-Voshardt Co., Chicago. . . . . B . . . . .
Grabler Mfg. Co., 6565 Broadway, S. E., Cleveland, O. . . . . I . . .
Great Eastern Brass Wks., Inc., 182 Grand, New York, N. Y. (Spindles).
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn. . . . . S . .
Isco. See Fixturelite Mfg. Co.
Jiffy. See White Mfg. Co., J. H.
Kwikon. See Fralick Co., S. R.
Lakin. See Thomas & Betts Co.
Liberty Brass Turning Co., 88 Walker, New York, N. Y. . . . . I . . .
Liberty Iron Pipe & Nipple Works, 62 Greene, New York, N. Y. . . . . B I . . .
Liberty Machine Co., Wauwatosa, Wis. . . . . B I . . .
L & K Mfg. Co., 440 Adelphi, Brooklyn, N. Y. . . . . H
L. & W. Brass Wks., 361 W. Superior, Chicago. B . . . .
Madelite. See Belson Mfg. Co.
M. S. W. Mfg. Co., 1527 Niagara Ave., Buffalo, N. Y. . . . . I . . .
Melaun Mfg. Co., 144 E. Morris, Indianapolis, Ind. . . . . B . . . .
Meta. Products Co., 210 Canal, New York. . . . B . . . .
Metro Iron Ornament Co., 191 Christie, New York, N. Y. . . . . I . . .
Metropolitan-Columbia Mfg. Co., 714 Metropolitan Ave., Brooklyn, N. Y. . . . . B . . . .
Midwest Elec. Co., 1639 Walnut, Chicago, Ill. . . I . . .
Mid-West Chandelier Co., 14th & Chestnut Sts., Kansas City, Mo. . . . . B . . . .
Monarch. See Perfeclite Co.
Murlin Mfg. Co., Philadelphia, Pa. . . . . B I . . .
National Electric Products Corp., Pittsburgh, Pa. (Studs.) . . . . . I . . .
New Era Elec. Mfg. Co., 6725 Machinery Ave., N. E., Cleveland, O. . . . . H
New Wrinkle. See Bryant Elec. Co.
New York Brass Turning Co., 568 Broadway, New York, N. Y. . . . . B . . . .
Nobolt. See Fralick & Co., S. R.
N. W. Cleat Receptacle Bracket, 2437 N. 29th, Philadelphia, Pa. . . . . I . . .
Onli. See Perfeclite Co.
Pass & Seymour, Solvay Sta., Syracuse, N. Y. B . . S . .
Perfeclite Co., 1457 E. 40th, Cleveland. . . . . S . .
Pittsburgh Valve & Fittings Co., Barberton, O. . . I . . .
Plume & Atwood Mfg. Co., Waterbury, Conn. B . . S H
Plumwood. See Plume & Atwood Mfg. Co.
Plymouth. See Vester Sons, Alfred.
Products Machine Co., Bridgeport, Conn. . . . . B . . . .
Reading Brass Co., 141 Schiller, Reading, Pa. B I . . .
Ribayson Mfg. Co., J., 952 W. Lake, Chicago, Ill. B . . . .
Rocale Mfg. Co., 200 Hudson, New York. . . . B . . . H
Sandow Tool Co., 1440 Bway, New York, N. Y. . . . S . .
Scovill Mfg. Co., Waterbury, Conn. . . . . B I . . .
Simpalite. See Sprecher Mfg. Co., P. W.
Simplex. See Plume & Atwood Mfg. Co.
Springfast. See Plume & Atwood Mfg. Co.
Square-Gee. See Grabler Mfg. Co.
Standard Snap-Lite Corp., 504 Jackson Ave., Long Island City, N. Y. . . . . S . .
Standard Metal Spinning Co., 128 Mott, New York, N. Y. . . . . B . . . .
Star. See Perfeclite Co.
Star. See Steel City Elec. Co.
Steel City Elec. Co., Pittsburgh, Pa. . . . . I . . .
Steele & Johnson Mfg. Co., Waterbury, Conn. B . . S . .
Stembridge & Brandt, 29 S. Clinton, Chicago, Ill. (White Metal.) . . . . . B . . . .
Sterling Spinning & Stamping Wks., 476 Broome, New York, N. Y.
T. & B. See Thomas & Betts Co.
Thomas & Betts Co., 63 Vesey, New York. . . . . I . . .
Uno. See Bryant Elec. Co., also Crouse-Hinds, also General Elec. Co., also Hart & Hegeman Mfg. Co., also Pass & Seymour.
United. See L & K Mfg. Co.
United Metal Spinning Co., 440 Adelphi, Brooklyn, N. Y. . . . . B . . . .
Universal Brass Wks., 200 Vine, Philadelphia. B . . . .
Vester, Sons, Alfred, 5 Mason, Providence, R. I. B
Victor. See Plume & Atwood Mfg. Co.
Virden, Div. of Gill-Virden Co., 6108 Longfellow Ave., Cleveland, O. . . . . B . . . .
Walden Tool & Metal Mfg. Co., New Haven Conn. . . . . .
Wameco. See Waterbury Metal Wares Co.
Waterbury Metal Wares Co., Waterbury, Conn. . . . S . .
Weber Brass Co., Whitney Power Block, Cleveland, O. . . . . B . . . .
White Diamond. See White Mfg. Co., J. H.
White Mfg. Co., J. H., 79 Madison Ave., New York, N. Y. . . . . B . . S . .
Wilhite Machine Wks., 1245 S. Hope, Los Angeles, Cal. . . . . B . . . .

FLASHERS, Sign

Motor Flashers, Thermal Flashers, Flashing Sockets and Plugs.
Ajax. See Reynolds Spring Co.
A. & W. See General Outdoor Adv. Co.

We make fibre parts in endless stream from our fibre tubing

Fibre BRANDYWINE

BRANDYWINE Fibre Parts are not only intricate in design but are accurately and carefully made for electrical manufacturers whose needs are most exacting. We give just as much attention to the simpler, less complicated parts, too.

The material used by BRANDYWINE is the best. Our extreme high quality of work is maintained throughout production.

We are prepared to ship immediately any quantity or size of fibre tubing in all mill lengths.

Write for booklet and prices.

BRANDYWINE FIBRE PRODUCTS CO.
1402 Walnut St., Wilmington, Del.

INSULATING PAPERS FOR THE ELECTRICAL INDUSTRY

Red Rope Paper
Armature Paper
Imitation Pressboard
Cable Paper
Glassine

Made by
RIEGEL PAPER CORPORATION
342 Madison Ave. New York
MILLS IN NEW JERSEY AT RIEGELSVILLE AND MILFORD

ONEIDA FLEXIBLE COUPLING

The positive connection— between motor and machine

. . . . and, at the same time. ONEIDA Flexible Coupling is a life-saving shock absorber that takes up the jolts of sudden starts and stops. It lengthens the life of both motor and machine. Power generated is power delivered through the ONEIDA.

We manufacture many sizes of couplings for various size motors. Let us send you a sample of the size you require.

DELBEE RUBBER CO., Syracuse, N. Y.

FLASHERS, Sign—Continued.
Angelus. See Electric Sign Flasher Corp.
Betts, Inc., James H., 1393 Sedgwick Ave., New York. (Motor Flashers, Thermal Flashers, Flashing Sockets and Plugs.)
Betts & Betts Corp., 548 W. 43rd, New York, N. Y. (Motor Flashers.) (Thermal Flashers.) Flashing Plugs.)
California Sign Flasher Co., 280 Guttenberg, San Francisco
Commercial Elec. Co., 1203 E. Grant, Portland, Ore.
Consolidated Elec. Sign Corp., Opalume Div., 99 West Main, Battle Creek, Mich.
Diamond. See General Appliance Corp.
Eagle Elec. Mfg. Co., 79 Hall, Brooklyn, N. Y.
Electric Signal Corp., 405 Fourth Ave., Seattle, Wash.
Electric Sign Flasher Corp., 1838 W. 9th, Los Angeles, Cal.
Figuregram. See Reynolds Electric Co.
Flash O-Lite. See Betts, Inc., James H.
Flip-Flop. See Betts, Inc., James H.
Gem Engineering Co., Hempstead, N. Y.
Gacor. See General Appliance Corp.
General Appliance Corp., 120 8th, San Francisco, Cal. (Flasher Button.)
General Kontrolar Co., 200 E. First, Dayton, O.
Grazier Elec'l Products Co., Johnstown, Pa.
Harrington-Seaberg Corp., 1708 Third Ave., Moline, Ill.
Horni Signal Mfg. Co., 516 Greenwich, New York, N. Y.
Hotchkiss. See Time-O-State Controls Co.
Jimbetts. See Betts, Inc., James H.
Killark. See Betts & Betts Corp.
Kontrolar. See General Kontrolar Co. & Leland Elec. Co.
Leland Electric Co., Dayton, O.
Mercury. See Betts, Inc., James H.
Phelps Elec. Co., 29 S. Clinton, Chicago, Ill. (Motorless)
Phoenix Products Co., Phoenix, N. Y.
Presto Products Co., 520 Broadway, New York, N. Y. (Sockets and Plugs.)
Reco. See Reynolds Elec. Co.
Reynolds Elec. Co., 2622 W. Congress, Chicago, Ill.
Reynolds Spring Co., Jackson, Mich.
Rodale Mfg. Co., 200 Hudson, New York, N. Y.
Ryan. See Phoenix Products Co.
Skedoodle. See Phelps Elec. Co.
Sokit. See Betts, Inc., James H.
Thermo-Wynk. See Betts & Betts Corp.
Time-O-State Controls Co., Elkhart, Ind.
Varo. See Betts & Betts Corp.
Veebar. See Betts, Inc., James H.
Way, Eugene W., Seattle, Wash.
Wood Electric Co., C. D., 565 Broadway, New York, N. Y.
Woodwin. See Wood Elec. Co., C. D.
Wynk-A-Lyte. See Betts & Betts Corp.

FLASHLIGHT LENSES. See Lenses.

FLEXIBLE ARMS. See Tubing, Flexible Metallic.

FLEXIBLE LEADS, Commutator Brush. See Brushes, Commutator.

FLEXIBLE SHAFTING

Binghamton Flexible Shaft Co., 239 Water, Binghamton, N. Y.
Chicago Flexible Shaft Co., 5600 W. Roosevelt Rd., Chicago, Ill.
Haskins Co., R. G., 4636 W. Fulton, Chicago, Ill.
Stow Mfg. Co., 443 State, Binghamton, N. Y.
Strand & Co., N. A., 5001 N. Lincoln, Chicago, Ill.

FOIL, Tin. See Tin Foil.

FORGINGS, Non-Ferrous

Scovill Mfg. Co., Waterbury, Conn.

FORMS, Coil Winding

Armature Coil Equipment Co., 2415 Forestdale Ave., Cleveland, O.
Comstock Mfg. Co., Wilkes-Barre, Pa.
Master. See Armature Coil Equipment Co.

FORMS, Wire

Forms and Frames for Shade Holders and Shades: Bending, Welding, Forming.
American Specialty Mfg. Co., 165 Holland Ave., Bridgeport, Conn.
Arrow Wire Frame Corp., 344 E. 23rd, New York, N. Y.
Blake & Johnson Co., 1497 Thomaston Ave. (Waterville), Waterbury, Conn.
Central Wire Frame Co., 154 E. 23rd, New York, N. Y. (Complete with socket, cord and plug.)
Chelsea Wire Wks., 675 Hudson, New York, N. Y.
Clark Metal Products Inc., 490 Hancock Ave., Bridgeport, Conn.
City Wire Frame Co., 2025 S. Michigan Ave., Chicago
Electro Weld Co., 70 Munroe, Lynn, Mass.
Fischer Spring Co., Chas., 238 Kent Ave., Brooklyn, N. Y.
Grammes & Sons, Inc., L. F., Allentown, Pa.
Hubbard Spring Co., M. D., Pontiac, Mich.
Humason Mfg. Co., Forestville, Conn.
Hunter Pressed Steel Co., Lansdale, Pa.
Idealite Lamp Shade Mfg. Co., 49-55 Fremont, Jersey City, N. J.
Jenkinson & Co., R. C., 293 Washington, Newark, N. J.
Jeschke Wire Specialty Wks., Crawfordsville, Ind.
Krischer's Mfg. Co., 255 Calyer, Brooklyn, N. Y.
Manhattan Wire Products Co., 398 First Ave., New York
Mattatuck Mfg. Co., Waterbury, Conn.
Murray Hill Wire Frame Co., 214 E. 42nd, New York, N.
No-Draft Fan Fixture Co., 1703 Builder Bldg., Chicago, Ill. (Fan Guard.)
Protectafan Co., 6152 Delmar Blvd., St. Louis, Mo. (Fan Guard.)
Roebling's Sons Co., John A., Trenton, N. J.
Steinen & Co., 297 Washington, Newark, N. J.
Watral & Sons, 133 E. 16th, New York, N. Y.
Young Industries, Inc., L. A., Detroit, Mich.

FRAMES, Wire. See Forms, Wire.

FRICTION TAPE. See Tape, Rubber and Friction

FRINGE, Chandelier. See Crystals, Chandelier.

FUSE CLIPS

Sherman Mfg. Co., H. B., Battle Creek, Mich.
Waterbury Brass Goods Co., Waterbury, Conn.

FUSE PLUG SCREW SHELLS. See Shells, Screw Socket.

FUSE TESTERS. See Testers, Fuse and Circuit.

FUSES AND FUSE WIRE

KEY

Cartridge ..... See C
Plug ..... See P
Non-Refillable ..... See N
Refillable ..... See R
Open Link ..... See O
Fuse Wire ..... See O

Acme Elec. & Mfg. Co., Canal & Hamilton Ave., Trenton, N. J. ..... P
Aluminum Co. of America, 2444 Oliver Bldg., Pittsburgh, Pa. ..... O
Arkless. See Economy Fuse Mfg. Co.
Automatic Elec. Iron & Fuse Co., 215 S. American, Philadelphia, Pa. ..... P

Bryant Elec. Co., 1421 State, Bridgeport, Conn.
Bussmann Mfg. Co., University & Jefferson Ave., St. Louis ..... C P N R O
Chase-Shawmut Co., Newburyport, Mass. ..... C P N R O
C-E-Z. See Bryant Elec. Co.
Clearite. See Economy Fuse & Mfg. Co.
Clear-Top. See Trico Fuse Mfg. Co.
Colortop. See Trico Fuse Mfg. Co.
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn. (Automobile) ..... C .. N R ..
Commercial Enclosed Fuse Co., 1317 Willow Ave., Hoboken, N. J. ..... C P N .. ..
Cote Bros. Mfg. Co., 182 W. Lake, Chicago ..... C P .. R ..
Crystal. See Royal Elec. Co.
Daum Fuse & Elec. Mfg. Co., 1157 Hodgkins, Pittsburgh ..... C .. .. R ..
D. & W. See Graybar Electric Co.
Eagle Electric Mfg. Co., Inc., 49 Hall, Brooklyn, N. Y. ..... P .. .. ..
Economy Fuse & Mfg. Co., 2717 Greenview Ave., Chicago, Ill. ..... C P N R ..
Electric Fuseguard Co., Charlottesville, Va. .. C P N R ..
Elliott Electric Co., Shreveport, La. ....
Gem. See Jefferson Elec. Co.
General Elec. Co., Merchandise Dept., Bridgeport, Conn. ..... C P N R ..
Graybar Electric Co., Graybar Bldg., Lexington Ave. and 43rd St., New York, N. Y. (.. .. ..
Great Western Fuse Co., 415 Lexington Ave., New York, N. Y. .... R ..
H. & H. See Hart & Hegeman
Hudson Wire Co., Ossining, N. Y. .... O
Jefferson Electric Co., 1500 S. Laflin, Chicago, Ill. ..... C P N R O
Kanark. See Trico Fuse Mfg. Co.
Kirkman Engrg. Co., 1 Dominick St., New York, N. Y. ..... C P N .. O
Littelfuse Laboratories, 1772 Wilson Ave., Chicago, Ill. (Low Capacity, Glass Enclosed, .025 to 2 Amp.) ....
Monarch Fuse Co., 116 E. First, Jamestown, N. Y. ..... C .. N R
National. See Economy Fuse & Mfg. Co.
Noark. See Colt's Patent Fire Arms Mfg. Co.
Pierce Renewable Fuses, Inc., 752 Main, Buffalo, N. Y. ..... C P .. R ..
Platt Bros. & Co., Waterbury, Conn. .... O
Powell, F. W., 119 W. Ohio, Pittsburgh ..... P .. R ..
Pyrotite. See Bryant Electric Co.
Dee-Nu-It Elec. Co., New Bedford, Mass. .. C P .. R ..
Rochester Re-Fill Fuse Co., 402 Cottage, Rochester, N. Y. ..... C .. .. R ..
Royal Elec. Co., Chelsea Station, Boston ..... P N .. ..
Seco. See U. S. Electric Co.
Shawmut. See Chase-Shawmut Co.
Simplicity. See Cote Bros. Mfg. Co.
Six-in-One. See Industrial Engrg. Co.
Star Fuse Co., 235 Canal, New York, N. Y. C P .. R
Trico Fuse Mfg. Co., 1001 McKinley Ave., Milwaukee ..... C P N R
Union. See Jefferson Elec. Co.
U. S. Electric Co., 18 Chambers, Trenton, N.J. .. P .. .. ..

GALVANIZING

Cattie & Bros., Joseph P., Gaul and Lotterly Sts., Philadelphia, Pa.

GALVANOMETERS. See Instruments, Laboratory Standard.

GAS, Inert

Helium Co., Louisville, Ky.
Palestine Industrial Co., 111 Fifth Ave., New York, N. Y.
Weber, Alfred, 5 Union Square, New York, N. Y.

GAS SIGN ELECTRODES. See Electrodes for Gas Signs

GASKETS.

See also Washers, Non Metallic; Fiber.
Bosley Co., D. W., 906 Marquette Bldg., Chicago, Ill.
Gutta Percha & Rubber Mfg. Co., 15 Park Row, New York
Canfield Rubber Co., Bridgeport, Conn.
Wrigley Bros., 356 W. 18th, New York, N. Y.

GAUZE BRUSHES, Wire. See Brushes, Commutator

GEARS, Fibre. See Gears and Pinions, Composition

GEARS (Speed Changing Units)

Albro-Clem Elevator Co. and Atlantic Elevator Co., 501 E. Erie Ave., Philadelphia, Pa.
Cleveland Worm & Gear Co., Cleveland, Ohio.
Cullman Wheel Co., 1346 Altgeld, Chicago, Ill.
De Laval Steam Turbine Co., Trenton, N. J.
Falk Corp., Milwaukee, Wis.
Farrell-Birmingham Co., 344 Vielcan, Buffalo, N. Y.
Foote Bros. Gear & Machine Co., 215 N. Curtis, Chicago, Ill.
Gears & Forgings, Inc., Cleveland, Ohio.
Grant Gear Works, Boston, Mass.
Horsburgh & Scott Co., Cleveland, O.
James Mfg. Co., D. O., Chicago, Ill.
Janette Mfg. Co., 556 W. Monroe, Chicago, Ill.
Jones Fdy. & Machine Co., W. A., Chicago, Ill.
Lewellen Mfg. Co., Columbus, Ind.
Lyne, W. C., Syracuse, N. Y.
Nuttall Wks. of Westinghouse Elec. & Mfg. Co., McCandless Ave. & Harrison St., Pittsburgh, Pa.
Morrison Machine Co., Paterson, N. J.
Primer-Bee Co., 1750 Poland Ave., Detroit, Mich.
Ohio Gear Co., 1336 E. 179th, Cleveland, Ohio.
Perkins Machine & Gear Co., 125 Circuit Ave., Springfield, Mass.
Philadelphia Gear Works, Richmond and Tioga Sts., Philadelphia, Pa.
Smith, Winfield H., Springville, N. Y.

GEARS, Worm

Albaugh-Dover Mfg. Co., 2100 Marshall Blvd., Chicago, Ill.
Cleveland Worm & Gear Co., Cleveland, Ohio.
Colgan Gear & Mfg. Co. (Norfolk Downs), Quincy, Mass.
Ohio Gear Co., 1336 E. 179th, Cleveland, Ohio.
Philadelphia Gear Works, Richmond and Tioga Sts., Philadelphia, Pa.

Cork, Felt, Paper and Rubber
GASKETS
WRIGLEY BROTHERS
356 West 18th Street, N. Y. City

GEARS AND PINIONS, Composition

Continental Diamond Fibre Co., Bridgeport, Conn.
Delaware Hard Fibre Co., Box 970M, Wilmington, Del.
Fabroil. See General Elec. Co.
Foote Bros. Gear & Machine Co., 215 N. Curtis, Chicago.
Franklin Fibre Specialty Co., Wilmington, Del.
General Electric Co., Schenectady, N. Y.
Medart Co., St. Louis, Mo.
Micarta. See Westinghouse Elec. & Mfg. Co.
National Vulcanized Fibre Co., Wilmington, Del.
Ohio Gear Co., 1336 E. 179th, Cleveland, Ohio.
Perkins Machine & Gear Co., 125 Circuit Ave., Springfield, Mass.
Stahl Gear & Machine Co., 1390 E. 40th, Cleveland, Ohio
Stranahan Gear Co., Philadelphia, Pa.
Textoil. See General Electric Co.
Textolite. See General Electric Co.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

GEARS AND PINIONS, Iron and Steel

Chicago Gear Wks., 769 W. Jackson Blvd., Chicago, Ill.
Earle Gear & Machine Co., Wayne Junction, Philadelphia
Falk Corp., Milwaukee, Wis.
Gears & Forgings, Inc., Cleveland, Ohio
Grant Gear Works, Boston, Mass.
James Mfg. Co., D. O., Chicago, Ill.
Medart Co., St. Louis, Mo.
Meisel Bros. Mfg. Co., 944 Dorchester Ave., Boston, Mass.
Ohio Gear Co., 1336 E. 179th, Cleveland, Ohio.
Perkins Machine & Gear Co., 125 Circuit Ave., Springfield, Mass.
Permag. See Perkins Machine.
Pool Steel Gear & Pinion Co., Cincinnati, Ohio.

GEARS AND PINIONS, Rawhide

Chicago Rawhide Mfg. Co., 1287 Elston Ave., Chicago, Ill.
Gerdes & Co., 30 Church, New York, N. Y.
Syracuse Rawhide Mfg. Co., Syracuse, N. Y.
Western Rawhide & Belting Co., Milwaukee, Wis.

GENERATORS, Electroplating. See Plating Generators

GLASS BULBS. See Bulbs, Glass.

GLASS CANDLES. See Candles, Fixture

GLASS LETTERS. See Letters, Sign.

GLASS for Electrical Purposes

Canton Glass Co., Marion, Ind.
Corning Glass Wks., Corning, N. Y.
Pyrex. See Corning Glass Wks.

GLASSWARE

Atlas Glass & Mirror Co., 2315 Ogden Ave., Chicago, Ill.
Bayley & Sons, 105 Vanderveer, Brooklyn, N. Y. "Equalite."
Beaumont Co., Morgantown, W. Va.
Bienenfeld Glass Wks., Inc., 1539 Covert, Brooklyn, N. Y.
Chesler & Sons, I., 45 Varick Ave., Brooklyn, N. Y.
Consolidated Lamp & Glass Co., Coraopolis, Pa. "Amelite," "Aurora," "Cora," "Nulite," "Pastelle," "Rosedora," "Shade-O-Tone."
Corning Glass Co., Corning, N. Y. "Aurene," "Calcite."
Eagle Mfg. Co., Wellsburg, W. Va.
Forger & Co., A. H., 2414 E. 58th, Los Angeles, Cal.
Gill Glass Div. of Gill-Virden Co., Amber & Venango Sts., Philadelphia, Pa. "Alliglass," "Gillgio," "Gillway," "Hyperion," "Nova," "Una," "Utilitilite," "Velva."
Gillinder Bros., Inc., Port Jervis, N. Y. "Apollo," "Embroidro," "Celatone."
Gillinder & Sons, Inc., Philadelphia, Pa. "Glassilk," "Persian," "Mellilite," "Micro."
Glass & Mfg. Co., Wellsburg, W. Va.
Gleason-Tiebout Glass Co., 99 Commercial, Brooklyn, N. Y. "Alabaster," "Amazon," "Blanco," "Carmia," "Carrara," "Celestialite," "Florentine," "Gletian," "Gletieco," "Opalux," "Polycase," "Silverglow."
Holophane Co., 342 Madison Ave., New York, N. Y.
Imperial Glass Co., Bellaire, O. "Nuart."
Inland Glass Wks., Inc., 6101 W. 65th, Chicago, Ill. "Snow White," "Inlite," "Alabaster," "Cased," "Crackled," "Etched."
Ivanhoe Division of Miller Co., Cleveland, O. "Clearcut," "Druid," "Genco," "Ivre," "Regent," "Regello," "Sudan," "Trojan," "Voloria," "Yural."
Jeannette Shade & Novelty Co., Jeannette, Pa. "Ardmore," "Tensolite."
Jefferson Glass Co., Follansbee, W. Va. "Moonstone," "Nitro-Glass."
Kopp Glass, Inc., Swissvale, Pa. "Havana," "Nicco," "Delica White."
Lamp & Glass Specialty Co., Monaca, Pa.
Macbeth-Evans Glass Co., Charleroi, Pa. "Alba," "Cremax," "Monax," "Thebian," "Lumite," "Galax."
McFaddin & Co., H. G., 38 Warren, New York, N. Y. "Bellova," "Emeralite."
Perfection Glass Co., Star City, W. Va. "Oplex."
Phoenix Glass Co., Monaca, Pa. "Ivory," "Magnolia," "Radiant."
Plaut & Co., L., 432 E. 23rd, New York, N. Y. "Berylite."
Rawson & Evans Co., 710 Washington Blvd., Chicago, Ill.
Star Glass Co., Star City, W. Va.
Steimer, Doran & Rowe, 336 Fourth Ave., Pittsburgh, Pa. "Radax."
United Novelty Glass Mfg. Co., 121 Prince, New York, N. Y.
Wells Glass Co., Kokomo, Ind. "Daylite."
Williamsburg Flint Glass Co., 290 Broadway, New York.
Zanesville Mould Co., Zanesville, O.

GONGS, Unmounted Shells

Bevin Bros. Mfg. Co., East Hampton, Conn.
Bridgeport Brass Co., 774 E. Main, Bridgeport, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
East Hampton Bell Co., East Hampton, Conn.
Gong Bell Mfg. Co., East Hampton, Conn.
Hill Brass Co., M. N., East Hampton, Conn.
Liberty Bell Mfg. Co., Minerva, O.
Reiter, G. C., Canton, O.

GRAPHITE BEARINGS. See Bearings, Oil-less.

GREASE CUPS. See Cups, Grease.

GRID LEAKS. See Radio Circuit Components.

GRIDS, Resistance. See Units, Rods and Grids.

GRILL CLOTH. See Cloth, Untreated.

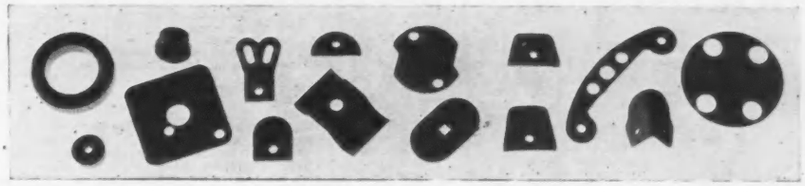
GRINDERS, Commutator. See Tools, Commutator Truing.

GROMMETS. See Eyelets.

GROUND LOCATORS. See Instruments, Portable and Switchboard; also Testers, Coil.

GROWLERS, Armature. See Testers, Coil.

GUARDS, FAN. See Forms, Wire.



FIBRE SPECIALTIES

from fibre headquarters~

Get a sample of **OHMOID**

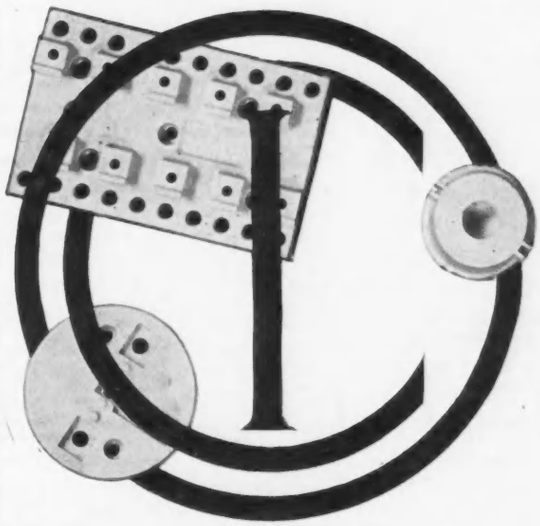
An approved laminated electrical insulation, having tremendous di-electric and crushing strength. Shock proof, non-deteriorating, and impervious to age, oil, grease and ordinary solvents. Test it yourself.

And it is here, with WILMINGTON that you can obtain any quantity of fabricated fibre in every conceivable shape.

With the advantage of enormous production—3,000,000 pieces daily—you are assured of 100% service in meeting your production program.

For your own machining we can supply you with any amount of rods, tubing, and fibre sheets. You are invited to write to "Fibre Headquarters" on any of your fibre problems.

WILMINGTON FIBRE SPECIALTY CO.
Wilmington, Del.
World's Largest Manufacturers of Fibre Specialties

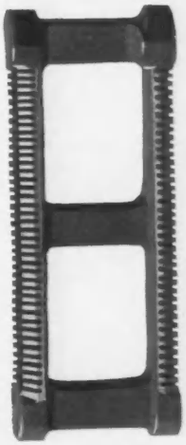


Colonial-*Quality*

Special Electrical Porcelain
and Refractory Porcelain

COLONIAL INSULATOR CO.
Established 1894
Akron, Ohio

LAVA
Insulators



The material lava possesses properties of vital importance in the adoption of insulating parts to be incorporated in electrically controlled machinery.

Lava possesses di-electric and mechanical strength, maintains accuracy of dimension and can be machined to special forms.

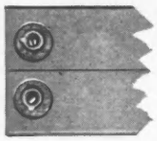
Though the design may be intricate, unusual facilities enable us to meet exacting specifications.

Write us for specific information.

AMERICAN LAVA CORPORATION
1425 William St. Chattanooga, Tennessee
Manufacturers of Heat Resistant Insulators

"HOLD-HEET"

Improved Heating Units



Designed to get heat out rather than keep it in. New types, thinner (⅛" outside thickness). Many improved, some patented features.

Space Heaters
Conduction Heaters
Immersion Heaters
Plating Tank Heaters

Full lines, many sizes and types. Attractive prices.

Write for Bulletins giving specifications and prices.

RUSSELL ELECTRIC CO.
384 W. Huron St., Chicago, Ill.

HANDLES, Wood; For Switches or Sad Irons

Allen, Chas. E., Pequabuck, Conn.
American Enamel Co., 20 Neville, Providence, R. I.
Bogert & Hopper, 225 Varick, New York, N. Y.
Estes & Son, E. B., 5844 Grand Central Terminal Bldg., New York, N. Y.
Fitchburg Enamel Co., Fitchburg, Mass.
Flanders Hardware Co., North Weare, N. H.
Fuller, J. J. Westfield, Mass.
Narragansett Mach. Co., Pawtucket, R. I.
National Wood Process, New Bedford, Mass.
Novelty Turning Co., Norway, Me.
Ober Mfg. Co., Chagrin Falls, O.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, O.
Piqua Handle & Mfg. Co., Piqua, Ohio.
Royal Enamel Co., Fitchburg, Mass.
Schutz Bros., 152 Chambers, New York, N. Y.
Stiles & Co., H. A., 174 Portland, Boston, Mass.
Stratton Mfg. Co., Stratton, Maine.
Strombeck-Becker Mfg. Co., Moline, Ill.
Sun Enamel Wks., Leominster, Mass.

HEATERS, Industrial

Beckwith Machine Co., 402 Chestnut, Ravenna, O.
Hold-Heet. See Russell Electric Co.
Russell Electric Co., 384 W. Huron, Chicago, Ill.
Sta-Warm. See Beckwith Machine Co.

HEATING ELEMENTS. See Units, Rods & Grids.

HOLDERS, Brush. See Brushes, Commutator.

HOT WIRE METERS. See Instruments, Portable and Switchboard.

IMPREGNATING COMPOUNDS. See Wax and Compounds.

IMPREGNATING, VACUUM. See Ovens, Industrial.

INCANDESCENT LAMP BULBS (Unfinished). See Bulbs, Glass.

INCANDESCENT LAMP FILAMENTS. See Filaments, Incandescent Lamp.

INDICATORS, Operation

Operation and Cost Indicators for Manager's Office.
Bristol Co., Waterbury, Conn. (Elapsed Time Recorder.)
Electric Indicator Corp., Stamford, Conn.
Elinco. See Electric Indicator Corp.
Production Meter Co., 1315 S. Wabash Ave., Chicago, Ill.

INDUCTION COILS. See Coils, Finished.

INSTRUMENT, Jewels. See Jewels.

INSTRUMENTS, Laboratory Standard. See Instruments, Laboratory Standard.

INSTRUMENTS, Portable Testing. See Instruments, Portable and Switchboard; also Instruments, Pocket.

INSTRUMENTS, Laboratory Standard

Argco Laboratories, Inc., 150 W. 22nd, New York, N. Y.
Beck Bros., 3640 N. Second, Philadelphia, Pa.
Biddle, James G., 1209 Arch, Philadelphia, Pa.
Burt, R. C., 327 Michigan Ave., Pasadena, Cal. (Oscilloscopes.)
Cambridge Instrument Co., Grand Central Terminal Bldg., New York, N. Y.
Chicago Apparatus Co., 1735 N. Ashland Ave., Chicago, Ill.
Delta-Star Elec. Co., 2437 Fulton, Chicago, Ill.
Eppley Laboratory, Newport, R. I. (Standard Cells.)
Fahy. See Rubicon Co.
General Electric Co., Schenectady, N. Y.
Gray Instrument Co., 64½ W. Johnson, Philadelphia, Pa.
Hickok Elec'l Instrument Co., 10514 Dupont, Cleveland, O.
Jazahi. See Biddle, James G.
Jewell Elec'l Instrument Co., 1650 Walnut, Chicago, Ill.
Kasson. See Rawson Elec'l Instrument Co.
Kelvin. See Leeds & Northrup Co.
Kohlrausch. See Leeds & Northrup Co.
Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia, Pa.
Milvay. See Chicago Apparatus Co.
Osiso. See Westinghouse Electric & Mfg. Co.
Rawson Elec'l Instrument Co., Cambridge, Mass.
Roller-Smith Co., 239 Broadway, New York, N. Y.
Rubicon Co., 29 N. Sixth, Philadelphia, Pa. (Wheatstone Bridges, Galvanometers, Inductance Condensers, Potentiometers, Resistance Boxes, Permeameters.)
Shallcross Mfg. Co., Collingdale, Pa.
Simplex. See Leeds & Northrup Co.
Strobatchy. See Argco Laboratories, Inc.
Stromberg Electric Co., 223 W. Erie, Chicago, Ill.
Thompson-Levering Co., 351 N. 57th St., Philadelphia, Pa.
Univolt. See Rawson Elec'l Inst. Co.
Vreeland Apparatus Co., 140 Cedar, New York, N. Y. (Sine Wave Oscillators.)
Westinghouse Electric & Mfg. Co., Newark, N. J.
Weston Elecl. Instrument Corp., 582 Frelinghuysen Ave., Newark, N. J.

INSTRUMENTS, Pocket

Advance. See Eldredge Elec'l Corp.
Adbro Mfg. Co., 927 French, Pittsburgh, Pa.
Eclipse. See Eldredge Elec'l Corp.
Eldredge Elec'l Corp. 3 P. O. Sq., Springfield, Mass.
Heyer Products Co., 197 Grove, Bloomfield, N. J.
Ideal Instrument Co., Penacook, N. H.
Jewell Elec. Instrument Co., 1650 Walnut, Chicago, Ill.
Kellogg Switchboard & Supply Co., 1066 W. Adams, Chicago, Ill.

Lundquist Tool & Mfg. Co., Worcester, Mass.
Milavolt. See Adbro Mfg. Co.
Readrite Meter Works, 7 College Ave., Bluffton, Ohio.
Roller-Smith Co., 239 Broadway, New York, N. Y.
Shire Elec. Products Co., Marquette Bldg., Detroit, Mich.
Sholder-Excel Mfg. Co., Clyde, Ohio.
Square D Company, Detroit, Mich.
Sterling Mfg. Co., 2831 Prospect Ave., Cleveland, Ohio.
Weston Elecl. Instrument Corp., 582 Frelinghuysen Ave., Newark, N. J.
Wigginton. See Square D Company.
Yankee. See Lundquist Tool Mfg. Co.

INSTRUMENTS, Portable and Switchboard

This heading includes all standard, portable and switchboard types, measuring and testing instruments—ammeters, voltmeters, wattmeters, ohmmeters, cable testers and fault-finders.

See Also Instruments, Pocket; Also Instruments, Laboratory Standard.

Argco Laboratories, Inc., 150 W. 22nd, New York, N. Y.
Beck Bros., 421 Sedgley Ave., Philadelphia, Pa.
Beede Instrument Co., Penacook, N. H.
Biddle, James G., 1209 Arch, Philadelphia, Pa.
Bristol Co., Waterbury, Conn.
Brown Instrument Co., Wayne and Windrim Sts., Philadelphia, Pa.
Cambridge Instrument Co., Grand Central Terminal, New York, N. Y.
Century Elecl. Co., 100 Randall Ave., Syracuse, N. Y.
Dongan Electric Mfg. Co., 2985 Franklin, Detroit, Mich.
Eastern Specialty Co., 3551 N. Fifth, Philadelphia, Pa.
Edison Lamps Works of G. E. Co., (Nela Park) Cleveland,
Electric Heat Control Co., 5902 Carnegie Ave., Cleveland, O. (Radio Condenser Test Set.)
Electric Mfg. Co., 966 Mission, San Francisco, Cal.
Esterline-Angus Co., Speedway, Indianapolis, Ind.
Etna Elec. Wks., 410 E. 15th, New York, N. Y.
Fidelity Electric Co., Lancaster, Pa.
Fisher Cable Test Sets. See Leeds & Northrup.
Fore Elecl. Mfg. Co., 5255 Wabada Ave., St. Louis, Mo.
Freyn Engrg. Co., 310 S. Michigan Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
General Radio Co., Cambridge, Mass.
Gray Instrument Co., 64½ W. Johnson, Philadelphia, Pa.
Ground-Ohmer. See Sticht & Co.
Hardy. See Weinberg & Co.
Heyer Products Co., 197 Grove, Bloomfield, N. J.
Hickok Elecl. Inst. Co., 10514 Dupont, Cleveland, O.
Hoyt Elecl. Inst. Wks., 857 Boylston, Boston, Mass.
I T L. See Illinois Testing Laboratories.
Jewell Elec'l Instrument Co., 1650 Walnut, Chicago, Ill.
King. See Electric Heat Control Co.
Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia, Pa.
Master. See Jewell Elecl. Instrument Co.
M. D. C. See Metropolitan Devices Corp.
Megger Testing Sets. See Biddle.
Metropolitan Devices Corp., 1250 Atlantic Ave., Brooklyn.
Multi-Volt Trouble Finder. See Weiford, Jr., Geo. W.
Norton Elecl. Inst. Co., 81 Hilliard, Manchester, Conn.
Paneltest Meters. See Beede Instrument Co.
Paragon Megohmer. See Sticht & Co., H. H.
Peerless Meters. See Thompson-Levering Co.
Pier Equipment Mfg. Co., Benton Harbor, Mich.
Pin-Jack. See Weston Elec'l Instrument Co.
Price Hollister Co., Rockford, Ill.
Queen. See Gray Instrument Co.
Rawson Elecl. Inst. Co., Cambridge, Mass.
Roller-Smith Co. 129 Broadway, New York, N. Y.
Sangamo Elec. Co., Springfield, Ill.
Shortfinder. See Eisemann Shortfinder Co.
Stanton. See Sticht Co., H. H.
States Co., Hartford, Conn.
Sterling Mfg. Co., 2831 Prospect Ave., Cleveland, Ohio.
Stewart Bros., Ottawa, Ill.
Sticht & Co., H. H., 13 Park Row, New York, N. Y.
Tanner Engrg. Co., Rawson St. and Nelson Ave., Long Island City, N. Y.
Test-A-Bat. See Beede Instrument Co.
Thomspon-Levering Co., 351 N. 57th, Philadelphia, Pa.
Thomson. See General Electric Co.
Triplex Meters. See Roller-Smith Co.
3 in 1. See Sticht & Co., H. H.
Two-in-One. See Stitcht Co., Herman H.
United States Gauge Co., 44 Beaver, New York, N. Y.
Utility. See Esterline-Angus Co.
Westinghouse Electric & Mfg. Co., Newark, N. J.
Weston Elecl. Instrument Corp., 582 Frelinghuysen Ave., Newark, N. J.

INSULATION (Insulating) (Insulators)

Beads. See Beads, Insulating.
Canopy. See Insulators, Canopy.
Cloth. See Cloth & Paper.
Composition. See Molded Insulation.
Compound. See Wax and Comp.
Fibre. See Fibre.
Lava. See Cores, Resistance Coil.
Marble. See Slate.
Mica. See Mica.
Molded. See Molded Insulation.
Paint. See Paint, Varnish, Laquer.
Paper. See Cloth and Paper Insulating.
Phenolic. See Fibre, Phenol. Also Molded Insulation.
Porcelain. See Porcelain.
Rod. See Rubber, Hard.
Rubber. See Rubber, Hard.
Sealing Wax. See Wax and Compounds.
Slate. See Slate.
Soapstone. See Soapstone.
Tubing. See Tubing, Varnished Fabrics.
Varnish. See Paint and Varnish.
Wax. See Wax and Compounds.

INSULATING MACHINES, WIRE. See Wire Manufacturing Machines.

INSULATING TUBING. See Tubing, Varnished Fabric; also Tubing, Rubber.

INSULATION CUTTERS

Artos Engrg. Co., 115 Brown, Milwaukee, Wis.

INSULATION MIXERS

Baker Perkins Co., Saginaw, Mich.

INSULATION SHEARS. See Shears, Insulation.

INSULATION STRAINING MACHINES. See Wire Manufacturing Machines.

INSULATION TESTERS. See Instruments, Laboratory Standard.

PORCELAIN
...the best
INSULATION
COOK POTTERY CO.,
Trenton, N. J.

INSULATORS, Canopy

Continental-Diamond Fibre Co., Bridgeport, Pa.
Franklin Fibre Specialty Co., Wilmington, Del.
General Electric Co., Schenectady, N. Y.
Macallen Co., Boston 27, Mass.
Wilmington Fibre Specialty Co., Wilmington, Del.

IRON CASTINGS. See Castings, Gray Iron.

IRONS, Soldering. See Soldering Irons.

JACKS, Armature. See Lifts, Armature.

JACKS, Radio. See Radio Receiver Parts.

JARS, Battery, Glass

Per Composition Jars. See Molded Insulation; also Rubber.

Corning Glass Co., Corning, N. Y.
Cumberland Glass Mfg. Co., Bridgeton, N. J.
Gaynor Glass Works, Salem, N. J.
Gillinder & Sons, Inc., Philadelphia, Pa.
Hazel-Atlas Glass Co., Wheeling, W. Va.
Macbeth-Evans Glass Co., Dept. G, Eastern Division, Charleroi, Pa.
Rodefer Glass Co., 21st, Bellaire, O.
Sneath Glass Co., Wabash Ave., Hartford City, Ind.
United States Glass Co., 9th & Bingham, Pittsburgh, Pa.

JEWELS, Instrument Bearing

Bird, Richard H., Waltham, Mass.
Deknatel & Sons, J. A., Queens Village, N. Y.
Eastern Specialty Co., 3551 N. Fifth, Philadelphia, Pa.
Fisher, Thomas E., Penacook, N. H.
Gatti, Inc., Aurele M., Liberty St. & Fairmount Ave., Trenton, N. J.
Hildrum Jewel Co., East Berlin, Conn.
Moser Jewel Co., 367 Division, Perth Amboy, N. J.
Sapphire Products Co., 51 Chambers, New York, N. Y.
Universal. See Oefinger, J. L.
Wennstrom's Sons Co., John, Suffern, N. Y.
Worley Jewel Co., John, Waltham, Mass.

JOINTS, Fixture Insulating

Appleton Elec. Co., 1703 Wellington Ave., Chicago, Ill.
Macallen Co., Boston 27, Mass.
Sandow Tool Co., 1440 Broadway, New York, N. Y.
Sprecher Mfg. Co., P. W., 3300 North Ave., Milwaukee.
White Co., O. C., 15 Hermon, Worcester, Mass.
Wittenberg Bros., 60 Shipman, Newark, N. J.

LABORATORY (Laboratories.)

Ovens. See Ovens, Industrial & Laboratory.
Rheostats. See Rheostats.
Testing. See Testing.

LABORATORY STANDARD INSTRUMENTS. See Instruments, Laboratory Standard.

LACQUER, ARMATURE. See Paint, Varnish and Lacquer.
Metal. See Paint, Varnish and Lacquer.

LAMINATIONS. See Discs, Armature.

LAMP BASES. See Bases, Reading Lamp.

LAMP BULBS (Unfinished). See Bulbs, Glass.

LAMP FILAMENTS. See Filaments, Incandescent Lamp.

LAMP LEAD-IN WELDS. See Filaments, Incandescent Lamp.

LAMP MAKING MACHINES. See Machines, Lamp Making.

LAMP TESTING PHOTOMETERS. See Photometers, Lamp.

LATHES

(Special for use in Motor Repairing and Motor Mfg.—Test Bench Lathes).

Ajax Electric Co., Kalamazoo, Michigan.
Allen Electric & Equipment Co., Kalamazoo, Michigan.
Cincinnati Lathe & Tool Co., 3207 Disney (Oakley) Cincinnati, Ohio.
Hobart Bros. Company, Troy, Ohio. (Test Bench).
South Bend Lathe Works, 425 E. Madison, South Bend, Ind.
Weidenroff, Joseph, 4352 Roosevelt Rd., Chicago, Ill.

LAVA. See Cores, Resistance Coil.

LEAD

American Lead Co., 3112 Penn Ave., Pittsburgh, Pa.
Blatchford Co., E. W., 608 Dearborn, Chicago, Ill.
Columbia Smelting & Refining Wks., 365 West, New York, N. Y.
Eagle-Picher Lead Co., 134 N. LaSalle, Chicago, Ill.
Federated Metals Corp., Woolworth Bldg., New York, N. Y.
Jacobson & Son Co., I. M., 15304 Idaho, Detroit, Mich.
National Lead Co., 111 Broadway, New York, N. Y.
Raymond Lead Co., 735 S. Washtenaw Ave., Chicago, Ill.
Turner Lead Co., East St. Louis, Ill.
United Metals Selling Co., 25 Broadway, New York, N. Y.

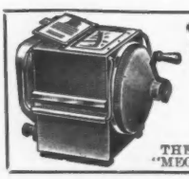
LEAD-IN WELDS, Lamp. See Filaments, Incandescent Lamp.

LEADS, FLEXIBLE (Commutator Brush). See Brushes.

LENSES

Sign Letter, Flashlight, Projector and Reflector Lenses. Also glass caps, jewels and bezels for all electrical devices. See also Jewels, Instrument Bearing.

Bausch & Lomb Optical Co., 635 St. Paul, Rochester, N. Y. (Condensing and Projection Lenses.)
B. B. T. Corp. of America, Atlantic Bldg., Philadelphia, Pa.
Corning Glass Wks, Corning, N. Y. (Flashlight and Signal.)
Deknatel & Sons, J. A., Queens Village, N. Y.
Electric Power Equipment Corp., 412 W. 18th, Philadelphia, Pa.
Elpeco. See Electric Power Equipment Corp.
Goerz American Optical Co., C. P., 317 E. 34th, New York.
Jefferson Glass Co., Follansbee, W. Va. (Sign and Flashlight.)



"MEGGER"

Insulation Testing Instruments
JAGABI Hand Tachometers
FRAHM Frequency Meters

JAMES G. BIDDLE
1209-11 Arch St.
Philadelphia

THE "MEG"

TESTING INSTRUMENTS

27 years' experience behind "CENTURY" Field, Armature and Field and Armature Testers. Write for bulletins.

CENTURY ELECTRICAL COMPANY
100-102 Randall Ave., Syracuse, N. Y.

STANDCO SPEED INDICATOR

Write for Leaflet 506.

HERMAN H. STICHT & CO.
13 Park Row New York, N. Y.

BAKELITE

for every electrical requirement

With our knowledge and moulding experience you may be assured that we can make the *special* piece exactly according to your specifications. We not only do the moulding but make the moulds. Every job is made under painstaking inspection.

KUHN & JACOB MACHINE & TOOL CO.
502 Prospect Avenue *Trenton, N. J.*

TOYCO SPONGE RUBBER

Also

Solid Soft Rubber Specialties

To shock-proof and insulate all manner of Electrical equipment. Send blue prints for prices and full particulars.

Dept. "W"
The Toycraft Rubber Co., Ashland, Ohio

Brawley felt feet

PROTECTION
that lasts
as long as
your product

If you make a product that should have the protective factors of FELT FEET, Brawley provides them with nail, wood or machine screw methods of attaching.

Nothing else will be as practical a safeguard, for Brawley Felt Feet will never need replacing. They cannot be destroyed, will not deteriorate, pull off or break off. They have been specified by many discriminating manufacturers after rigid tests; and your product should have the same lasting proof of protection.

Look for the name stamped in every one. Immediate shipment from large stocks of standard goods.

T. R. BRAWLEY FELT CO., Inc.
279 20th Street Brooklyn, N. Y.

INFORMATION WANTED

We have been asked for the names and addresses of manufacturers of the items listed below.

Replies from our readers to any of these inquiries will be greatly appreciated by the Information Bureau of ELECTRICAL MANUFACTURING, 461 Eighth Ave., New York City.

"Burrows" Therapeutic Lamp
"Defiance" Cigarette Lighter
"Flint" Waffle Iron
"L. R. Co." Receptacles
"Pioneer" House Pump
"Williams" Commutator Dressing
"Thermodyne" Therapeutic Lamp
"Aspinall" Soldering Fluid
"Indulet" Fittings
"Wilson" Box Supports
"Autochaffe" Heater for Bakery Ovens

"Hillcrest" Line of Lighting Fixtures asked for in our previous issue was originally manufactured by Domestic Chandelier Co. This concern was taken over by Puritan Ltg. Fixture Co., 299 Wallabout, Brooklyn, N. Y.

"Waverly" Test Clip asked for in our previous issue is manufactured by Waverly Musical Instrument Co., Long Island City, N. Y.

M.&W.Co
1876
LACQUERS
ENAMELS
Prismlac
Clear No. 23
Not Etched or Stamped.
Just spray and watch it Crystallize.
Air dries in less than one hour.
The New and Different Decorative Finish.
Ideal for Polished Brass or other Smooth Surfaces.
Your inquiry is invited.
MAAS & WALDSTEIN COMPANY
Executive Offices and Plants:
438 Riverside Ave., Newark, N. J.
Chicago Office and Warehouse: 1115 W. Washington Blvd.
Los Angeles Office and Warehouse: 1214 Venice Blvd.
The border of this advertisement is a photographic reproduction of M & W Prismlac.

BAKELITE MOULDERS

SHAW

FOUNDED 1892

Insulator Company

IRVINGTON, NEWARK, NEW JERSEY

GUMMON

COLD MOLDED—HEAT RESISTING

INSULATION

WIRING DEVICE PARTS

Dull or glossy finish in a variety of colors

GARFIELD MANUFACTURING COMPANY

GARFIELD, N. J.

MOULDED PORCELAIN

. . . the most satisfactory

MOULDED INSULATION

COOK POTTERY CO.

Trenton, N. J.

LENSES—Continued
Kliegl Bros. Universal Stage Ltg. Co., 321 W. 50th, New York, N. Y. (Condensing and Projector.)
Macbeth Evans Glass Co., Dept. G, Eastern Division, Charleroi, Pa. (Flashlight.)
North Light Corp., 30 W. 15th, New York, N. Y.
Popper & Sons, Leo, 147 Franklin, New York, N. Y.
Pyle National Co., 1334 N. Kostner Ave., Chicago, Ill.
Rochester Glass Products, Inc., 29 N. Water, Rochester N. Y.
Rodefer Glass Co., 21st, Bellaire, O. (Flashlight.)
Sneath Glass Co., Wabash Ave., Hartford City, Ind. (Sign.)
Stromberg-Carlson Telephone Mfg. Co., Rochester, N. Y.

LETTERS, Sign

Glass. Metal.
Adsign Corp, 113 W. 63rd, New York, N. Y.
Chain Products Co., 3924 Cooper Ave., Cleveland, O. (Brass and White Metal.)
Chicago Miniature Lamp Co., 654 W. Lake, Chicago, Ill. (Raised Letters for Signs.)
Eradium. See Pioneer Corporation.
Federal Elec. Co., 8700 S. State, Chicago, Ill. (Metal.)
Grammes & Sons, Inc., L. F., Allentown, Pa.
Heralite. See Pressed Prism Plate Glass Co.
Kolux Glass Sales Co., Kokomo, Ind.
Lu-Mi-Nus Signs, Inc., 2736 Wentworth Ave., Chicago, Ill.
Opalite Corp., 201 E. Ohio, Chicago, Ill.
Pioneer Corporation, 8308 Yale Ave., Chicago. (Luminous.)
Pressed Prism Plate Glass Co., Chicago, Ill. (Glass.)

LIFTS, Armature

Lifts, Hoists, Jacks, Trucks, Buggies, Floor Cranes.
Columbia Machine Works & Malleable Iron Co., Atlantic Ave. & Chestnut St., Brooklyn, N. Y.
Duff-Norton Mfg. Co., Pittsburgh, Pa.
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
Peerless. See Electric Service Supplies Co.
Ridlon Company, Frank, Boston, Mass.

LININGS, Socket

Remington Mfg. Co., 937 Barnum Ave., Bridgeport, Conn.
LOCK WASHERS. See Washers, Lock.
LOOP WINDERS & SPREADERS. See Winding Machines, Armature & Field Coil.
LOUD SPEAKER DIAPHRAGMS MATERIAL. See Cloth, Untreated; also Parchment Paper.

LOUD SPEAKERS

Manufacturers Units and Electric Pick-ups for Portable and Built-in Types.
Amplion. See Woolf, J. W. & W. L.
Baritone Mfg. Co., 846 Jackson Blvd., Chicago, Ill.
Boudette Mfg. Co., 67 Crescent Ave., Chelsea, Mass.
Brooklyn Metal Stamping Corp., 720 Atlantic Ave., Brooklyn, N. Y. (Electric Pick-up.)
Cannonball. See Cannon & Miller Co.
Cannon & Miller Co., Springwater, N. Y.
Chelten Electric Co., 4859 Stenton Ave., Philadelphia, Pa.
Conamic. See Operadio Mfg. Co.
Decatur Mfg. Co., 45 Herman St., Brooklyn, N. Y.
Detroit Reproducers, Inc., Lafayette & Meldrum Sts., Detroit, Mich.
Duo-Lac. See F. & H. Radio Laboratories.
Dynola. See Utah Radio Products Co.
Electrical Research Laboratories, 2500 Cottage Grove Ave., Chicago, Ill. (Units.)
Empire United Hat Block Co., 312 E. 42nd, New York.
Engineers Service Co., 25 Church, New York, N. Y. (Kit.)
Ensco. See Engineers Service Co.
Fenco Cone Co., 57 Murray, New York, N. Y. (Kit.)
Fidelity Radio Corp., Salt Lake City, Utah.
F. & H. Radio Laboratories, Fargo, N. D.
General Illuminating Co., 1101 Ocean P'kway, Brooklyn, N. Y.
Globe Technolian Corp., Reading, Mass.
G. R. P. See Penn Mfg. Co.
Jack Horner. See Operadio Mfg. Co.
Jensen Radio Mfg. Co., 6601 S. Laramie Ave., Chicago, Ill.
Kersten Radio Equipment, Inc., 1415 Fielford, Kalamazoo, Mich.
Kyle. See Newcombe-Hawley.
Magnavox Co., 4250 Horton, Oakland, Cal. Also Units.
Mandel Electric Co., 2157 N. California Ave., Chicago, Ill.
Marlsone Radio Mfg. Co., 303 Devoe, Brooklyn, N. Y. (Horn.)
Miles Mfg. Corp., 31 W. 21st, New York, N. Y.
Minuet. See Thompson Radio Co.
Newton Elec'l Mfg. Co., Newton, Mass.
O'Neil Mfg. Corp., West New York, N. J.
Operadio Mfg. Co., St. Charles, Ill.
Peerless. See United Reproducers Corp.
Philadelphia Storage Battery Co., Ontario & C Sts., Philadelphia, Pa.
Philco. See Philadelphia Storage Battery Co.
Platter Cabinet Co., North Vernon, Ind.
Powerola. See Temple Mfg. Corp.
Puropower. See Platter Cabinet Co.
Quam Radio Products Co., Div. of United Air Cleaner Corp., 9705 Cottage Grove Ave., Chicago, Ill.
Racon Elec. Co., 18 Washington Place, New York, N. Y. (Horn only.)
Red Lion Cabinet Co., Red Lion, Pa.
Sonochorde. See Boudette Mfg. Co.
Stromberg-Carlson Tel. Mfg. Co., Rochester, N. Y.
Swoboda Co., Maritime Bldg., Seattle, Wash.
Thompson Radio Co., 25 Church, New York, N. Y.
Ultratone Mfg. Co., 1046 W. Van Buren, Chicago, Ill.
Universal. High Power Telephone Co., Carleton Ave. and Eddy, Seattle, Wash.
Utah Radio Products Co., 1737 S. Michigan Ave., Chicago, Ill. (Also Piano Unit.)
Utona. See American Radio Products Corp.
Victor Radio Corp., 4321 N. Western Ave., Chicago, Ill.
Wondrphone. See Universal High-Power Telephone Co.
Wright-De Coster, Inc., St. Paul, Minn.

LUGS, Copper

Anderson Mfg. Co., Albert & J. M., 289 A St., Boston
Dante Elect. Mfg. Co., Bantam, Conn.
French Mfg. Co., Waterbury, Conn.
General Electric Co., Schenectady, N. Y.
Horan Co., E. S., 550 Monroe, Carlstadt, N. J.
Ilsco Copper Tube & Products, Inc., 5629 Madison Rd., Cincinnati, O.
Sherman Mfg. Co., H. B., Battle Creek, Mich.
Wolverine Tube Co., 1431 Central Ave., Detroit, Mich.

LUMINOUS SPECIALTIES

KEY

Luminous Compound .....See C
Pendants (Bulbs) .....See P
Standard Parts .....See S

Acornlite Studios, 675 72nd, Brooklyn, N. Y. ..... S
Bryant Electric Co., 1421 State, Bridgeport, Conn. .. P
Connecticut Elec. Mfg. Co., Bridgeport, Conn. ..... S
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee, Wis.
Eagelite. See Eagle Elec. Mfg. Co.
Eagle Elec. Mfg. Co., 79 Hall, Brooklyn, N. Y. ..... P
General Elec. Co., Merchandise Dept., Bridgeport, Conn. ..... S P
Glo-Guide. See Bryant Elec. Co.
Glow Lite. See Rodaie Mfg. Co.
Hubbell, Inc., Harvey, Bridgeport, Conn. ..... P
Luma & Luma Lite. See Radium Dial Co.
National Appliance Co. (Div. of Reynolds Spring Co.), Jackson, Mich. ..... S
Radieye. See General Electric Co.
Radium Dial Co., 3532 Forbes, Pittsburgh, Pa. ... C
Radiolo Mfg. Co., 200 Hudson, New York, N. Y. ..... P
Seelite. See T. C. Smith & Co.
Smith & Co., T. C., 3915 Powelton Ave., Philadelphia P
Undark. See United States Radium Corp. and Bryant Elec. Co.
United States Radium Corp., 535 Pearl, New York, N. Y. ..... C S P

MACHINE SCREWS. See Screws, Machine.
MACHINE SCREW PRODUCTS. See Screw Machine Products.

MACHINES

Armature Banding. See Banding Machines, Armature.
Armature Notching. See Notching Machines, Armature.
Balancing. See Balancers, Armature.
Banding. See Banding Machines, Armature.
Cable Armoring. See Wire Manufacturing Machines.
Coil Shaping. See Shaping Machines, Coil.
Coil Taping. See Taping Machines, Coil.
Coil Winding. See Winding Machines.
Commutator Slotting. See Mica Undercutters.
Engraving. See Engraving Machines.
Incandescent Lamp Making. See Machines, Lamp Making.
Molded Insulation. See Presses, Molded Insulation.
Perforating. See Perforating Machines.
Porcelain Molding. See Presses, Porcelain Molding.
Radio Tube. See Machines, Lamp Making.
Shaping. See Shaping Machines, Coil.
Slotting. See Mica Undercutters.
Soldering. See Soldering Machines, Commutator.
Spring Making. See Spring Making Machines.
Taping. See Taping Machines, Coil.
Tension. See Tension Machines, Band Wire.
Winding. See Winding Machines.
Wire, Armoring. See Wire Manufacturing Machines.
Wire Drawing. See Wire Drawing Machinery.
Wire Insulator. See Wire Manufacturing Machines.
Wire Measuring. See Wire Manufacturing Machines.
Wire Tension. See Tension Machines, Band Wire.
Wire Wrapping. See Wire Wrapping Machines.

MACHINES, Lamp Making

For Making Incandescent Lamps and Vacuum Tubes.
Argco Laboratories, Inc., 150 W. 22nd, New York, N. Y.
Arrow Mfg. & Machine Co., North Bergen, N. J.
Berrenberg, R., 12 Farnham (Roxbury), Boston, Mass. (Vacuum Pumps.)
Cserwenka, Frank, 35 Monroe, Passaic, N. J. (Bombarding Machines.)
Eisler Electric Corp., 770 S. 13th, Newark, N. J.
General Engineering & Supply Co., 160 5th Ave., New York N. Y. (Filament Winder.)
Genco. See General Engineering & Supply Co.
International Machine Wks., 527 32nd, Union City, N. J.
Rhasen Mfg. Co., 124 45th, Union City, N. J.
Siegler & Hartley, Inc., Worcester, Mass.
York Elec. & Machine Co., 30 Penn, York, Pa.

MACHINES, Bombarding. See Machines, Lamp Making.
MACHINES, Pleating and Fluting. See Pleating Machines.
MACHINES, Spring Making. See Spring Making Machines.
MACHINES, WIRE MANUFACTURING. See Wire Manufacturing Machines.

Moulders of Bakelite

a synthetic resin

BOONTON MOULDING CO.

300 Myrtle Ave.,

BOONTON, N. J.

MAGNET CHARGERS. See Chargers, Magnet.
MAGNET STEEL. See Steel, Magnet.
MAGNET TESTERS. See Instruments, Portable and Switchboard; also Instruments, Pocket.
MAGNET WIRE MACHINES. See Enameling Machines for Magnet Wire.
MAGNETIC CHUCKS. See Chucks, Magnetic.
MAGNETIC CLUTCHES. See Clutches, Magnetic.
MAGNETOMETERS. See Instruments, Pocket.

MAGNETS, Permanent

Bulleas Co., D. K., Pottstown, Pa.
Ind. Steel Products Co., 4545 S. Western Blvd., Chicago
Rogers Drop Forging Co., Worcester, Mass.
Stromberg-Carlson Tel. Mfg. Co., Rochester, N. Y.
Thomas & Skinner Steel Products Co., 1102 E. 23rd, Indianapolis, Ind.
Valley Appliances, Inc., 634 Lexington Ave., Rochester, N. Y.

MALLETS, Raw Hide

Chicago Rawhide Mfg. Co., 1287 Elston Ave., Chicago, Ill.
Crude Pelt. See Chicago Rawhide Mfg. Co.
Garland Mfg. Co., Soco, Me.
Holbrook Raw Hide Mfg. Co., 748 N. Main, Providence, R. I.
MANGANESE, Battery. See Chemicals, Battery.

MARKERS AND STAMPERS, Metal

Schmidt, Inc., Geo. T., 4102 Ravenswood Ave., Chicago, Ill.
MEASURING INSTRUMENTS. See Instruments.
METAL CUTTING OUTFITS. See Welding and Cutting
MECHANICAL RUBBER GOODS. See Rubber Mechanical Goods.
MEGOHMMETERS. See Instruments, Laboratory Standard

MELTING POTS AND LADLES, SOLDER, ETC.

Dunco. See Struthers Dunn, Inc.
Struthers Dunn, Inc., 138 N. Juniper, Philadelphia, Pa.
MERCURY SWITCHES. See Switches, Mercury.
METAL CLEANERS (Compound). See Cleaners, Metal.
Outfits.
METAL FINISHING. See Plating & Finishing.
METAL MARKING OUTFITS. See Engraving Machines.
METALLIC SHADES. See Shades, Metallic.
METERS. See Instruments.
MICA SHADES. See Shades, Mica.
MICA TAPE. See Tape, Mica.
MICA UNDERCUTTERS. See Slotting Machines & Tools, Commutator.

MICA

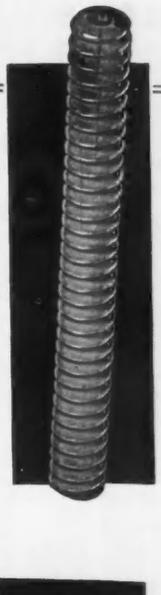
Asheville Mica Co., Biltmore, N. C.
Asco. See Schoonmaker Insulation Co.
Brand & Co., William, 268 Fourth Ave., New York, N. Y.
Chicago Mica Co., 345 Campbell, Valparaiso, Ind.
Colonial Mica Co., 136 Seventh, Jersey City, N. J.
Ford Radio & Mica Corp., 113 Bleecker, New York, N. Y.
Gerdau Co., Otto, 533 Canal, New York, N. Y.
Gillespie-Rogers-Pyatt Co., Inc., 99 John, New York, N. Y.
Hirsch Mica Co., 1087 Flushing Ave., Brooklyn, N. Y.
Hoyt, Inc., Philip S., Los Tablos, New Mexico.
Huse-Liberty Mica Co., 73 Long Wharf, Boston, Mass.
International Mica Co., 3660 Brandywine, Philadelphia, Pa.
Kant Krack. See Huse Liberty Mica Co.
Keene Mica Co., Keene, N. H.
Macallen Co., Boston 27, Mass.
Micabond. See Chicago Mica Co.
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
Miralite. See Mitchell-Rand Mfg. Co.
Mica Insulator Co., 200 Varick, New York, N. Y.
Mica Mfg. Co., 135 Johnson, Brooklyn, N. Y.
Micanite. See Mica Insulator Co.
Mica Products Mfg. Co., 54 Greene, New York, N. Y.
Munsell & Co., Eugene, 200 Varick, New York, N. Y.
Nemco. See New England Mica Co.
New England Mica Co., Waltham, Mass.
New England Minerals, Inc., 85 Devonshire, Boston, Mass.
New York Mica & Mfg. Co., Auburn, N. Y.
Peerless. See New England Mica Co.
Prestonite. See Robt. K. Preston Mica Co.
Preston Mica Co., Robt. K., 957 Monadnock Blk., Chicago (Ground Mica.)
Red Streak. See Huse Liberty Mica Co.
Schoonmaker Insulation Co., A. O., 34 University Place, New York, N. Y.
Sierra Mica Co., 11 Park Place, New York, N. Y.
Tar Heel Mica Co., Plumtree, N. C.
Watson Bros., 170 Purchase, Boston, Mass.
MINIATURE SWITCHBOARD SYSTEMS. See Instruments, Portable and Switchboard.
MIXERS, INSULATION. See Insulation Mixers.
MOLDED
Presses. See Presses, Molded Insulation.
Radio Parts. See Radio Molded Parts.
Shades. See Molded Insulation.

MOLDED INSULATION

Alco. See American Insulator Corp.
Aladdinite Co., Orange, N. J. (Caseine.)
Allen & Hills, Inc., Auburn, N. Y.
Ambler Asbestos Shingle & Sheathing Co., Ambler, Pa. (Cold.)
Ambleroid. See Ambler Asbestos Shingle & Sheathing Co.
American Insulator Corp., New Freedom, Pa.
American Machine & Foundry Co., 5520 Second Ave., Brooklyn, N. Y.
American Record Corp., Scranton, Pa.
Amerinc. See American Insulator Corp.
Auburn Button Wks., 48 Canoga, Auburn, N. Y.
Bakelite Corp., 247 Park Ave., New York, N. Y.
Bay State Moulding Co., 1197 Dorchester Ave., Boston.
Beatsol Corp., 226 Hillside Ave., Hillside, N. J.
Belden Mfg. Co., 4631 W. Van Buren, Chicago, Ill.
Bell Mfg. Co., 11 Elkins, Boston, Mass. Radio Parts.
Bettle. See Synthetic Plastics Co., Inc.
Boonton Molding Co., 300 Myrtle Ave., Boonton, N. J.
Boonton Rubber Mfg. Co., 223 Fanny Rd., Boonton, N. J.
Brewlite Moulding Corp., 109 Hudson, Jersey City, N. J. (Wood Composition.)

Porcelava

The best for Electric Heating Appliances



Our clay specialties, plain and threaded tubes, and Refractory Porcelain for Electric Heating Appliances are superior in every way; and "PORCELAVA" makes the best Pyrometer Insulation.

Burgess & Company
East Liverpool, Ohio
Factory at Wellsville, O.

Chicago Representative:
F. D. FARNAM & CO
189 No. Wells St., Chicago, Ill

PORCELAIN *by* AKRON

WE do not offer ONE grade of porcelain to fill every requirement.

After many years of engineering and research work we have produced a number of porcelain compounds.

In our new factory equipped "up-to-the-minute," we can produce porcelain to fill your individual requirements—and at minimum cost.

Send us drawings of your special porcelain pieces, stating your needs. We may be able to offer you something interesting.

The answer to exacting requirements

THE AKRON PORCELAIN CO.
Akron, Ohio
Specialists in Porcelain

THE FIRST PRACTICAL ELECTRIC RANGE EVER PUT ON THE MARKET EMBODIED OUR ELECTRICAL REFRACTORIES

EARLY in the experimental stages of electric range development, we did a lot of work on the perfection of a correct refractory for this exacting application.

Since then, we have produced electrical refractories for every device wherein electric heat plays its part. Of special importance is our line of heating element supports for electric furnaces.

Let us help you on your refractory problems — our large organization and ample facilities assure 100% cooperation and ultimate results.

THE ELECTRICAL REFRACTORIES COMPANY
East Palestine, Ohio
Chicago Detroit
San Francisco
St. Louis

MOLDED INSULATION—Continued
Celluloid Corp., 10 E. 40th, New York, N. Y.
Cepco. See Monowatt Corp.
Cetec. See Monowatt Corp.
Cetelite. See Monowatt Corp.
Celtrock. See Colt's Patent Firearms Mfg. Co.
Chicago Molded Products Co., 2144 Walnut, Chicago, Ill.
Cincinnati Molding Co., 2037 Florence Ave., Cincinnati, O.
Colasta Co., Hoosick Falls, N. Y.
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.
Compo-Site, Inc., 207 Astor, Newark, N. J.
Condensite. See Bakelite Corp.
Connecticut Elec. Mfg. Co., Bridgeport, Conn.
Continental-Diamond Fibre Co., Bridgeport, Pa.
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee.
Dayton Insulating Molding Co., 434 E. First, Dayton, Ohio.
Diemolding Corp., Canastota, N. Y.
Dimco. See Dayton Insulating Moulding Co.
Durex. See General Plastics, Inc.
Electrical Insulation Corp., 308 W. Washington, Chicago, Ill.
Electrose. See Insulation Mfg. Co.
Erinoid Co., Park Row Bldg., New York, N. Y.
Evercool. See Bakelite Corp.
Formica Insulation Co., 4628 Spring Grove Ave., Cincinnati.
Garfield Mfg. Co., Garfield, N. J. Composition. (Cold.)
General Electric Co., Schenectady, N. Y.
General Moulded Composition Co., 212 Market, Lynn, Mass.
General Plastics, Inc., 69 E. Walck Rd., N. Tonawanda, N. Y.
Grotelite Co., Grandview & Lafayette Aves., Bellvue, Ky
Gummor. See Garfield Mfg. Co.
Hann Mfg. Co., Harry W., 623 S. San Pedro, Los Angeles, Cal.
Hemmit. See Garfield, Mfg. Co.
Herculite. See Colosta Co.
Hi-Heet. See Insulation Mfg. Co.
Imperial Molded Products Co., 2925 W. Harrison, Chicago.
Impireco. See Insulation Products Co.
Inda. See American Machine & Foundry Co.
Insulation Mfg. Co., New York Ave. and Herkimer St. Brooklyn, N. Y.
Insulation Products Co., 404 Richland, Pittsburgh, Pa.
International Insulating, Division of General Industries Co., Elyria, O.
Karolith Corp., 2125 44th Rd., Long Island City, N. Y. (Casein plastics.)
Kellite. See Kellogg Switchboard & Supply Co.
Kellogg Switchboard & Supply Co., 1066 W. Adams, Chicago, Ill.
Klagges, Chas., 128 147th, Ozone Park, N. Y.
Kuhn & Jacob Machine & Tool Co., 502 Prospect Ave., Trenton, N. J.
Kurz-Kasch Co., S. Broadway & Morris, Dayton, O.
Lacanite. See Scranton Button Co.
Luco Products Corp., 40 Flatbush Ave. Extension, Brooklyn, N. Y.
Lumarith. See Celluloid Corp.
Luxite. See Wilbur & Williams Co.
Macallen Co., Boston, 27, Mass.
Mack Molding Co., Wayne, N. J.
Makalot. See Johnson Molding & Tool Co.
Megohom. See Waterbury Button Co.
Micarta Fabricators, Inc., 309 Canal, New York, N. Y.
Micarta. See Westinghouse Elec. & Mfg. Co.
Mica. See Molded Insulation Co.
Modern Molded Products Co., Blount and Elm Sts., Providence, R. I.
Molded Insulation Co., Mt. Vernon, N. Y.
Monowatt Electric Corp., 24 W. 40th, New York, N. Y.
National Appliance Co. (Div. of Reynolds Spring Co.) Jackson, Mich.
New England Products Co., 232 Greenwich, New York, N. Y.
Niagara Insul-Bake Specialty Co., 483 Delaware Ave., Albany, N. Y.
Noark. See Colt's Patent Fire Arms Mfg. Co.
Norloc. See Norton Laboratories, Inc.
Northern Industrial Chemical Co., 11 Elkin, South Boston
Norton Laboratories, Inc., Div. 84, Lockport, N. Y.
Panelyte Corp., Lincoln Bldg., New York, N. Y.
Paramix. See Splitdorf Radio Corp.
Paratherm. See Scranton Button Co.
Phenolic. See Scranton Button Co.
Plastic Molding Corp., Sandy Hook, Conn. (Cold.)
Plymouth Mfg. Co., 2148 Walnut, Chicago, Ill.
Pollopas. See Wilbur & Williams.
Pruven Composition Products Corp., Milford, Conn
Pruverite. See Pruven Composition Products Co.
Pyrolax. See Cutler-Hammer Mfg. Co.
Recto Mfg. Co., Appleton & B.&O. R.R., Cincinnati, O.
Redmonol. See Bakelite Corp.
Rexlite. See Northern Industrial Chemical Co.
Reynolite. See National Appliance Co.
Reynomold. See National Appliance Co.
Richardson Co., Lockland, Cincinnati, O.
Ridgelite. See Ridgley Trimmer Co.
Ridgley Trimmer Co., Springfield, O.
Schneider Bros., Inc., 312 N. Sheldon Ave., Chicago.
Shaw Insulator Co., Irvington, Newark, N. J.
Siemon Co., Stats and Dewey, Bridgeport, Conn.
Specialty Insulation Mfg. Co., Hoosick Falls, N. Y.
Star Insulate. See Insulation Mfg. Co.
Starlite. See Insulation Mfg. Co.
Stokes Rubber Co., Jos., Trenton, N. J.
Stokes & Smith Co., Summerdale Ave. near Roosevelt Blvd., Philadelphia, Pa.
Synthetic Plastic Co., Inc., 535 Fifth Ave., New York, N. Y. (Molding Powder).
Textolite. See General Elec. Co., also Electrical Insulation Corp.
Thermoplax. See Cutler-Hammer Mfg. Co.
Tegit. See Garfield Mfg. Co.
Union Insulating Co., Parkersburg, W. Va.
Vulcabeston. See Colt's Patent Fire Arms Mfg. Co.
Vulcanized Rubber Co., 251 Fourth Ave., New York N. Y.
Waterbury Button Co. (Elecl. Mfg. Dept.), **Waterbury, Conn.**
Watertown Mfg. Co., Watertown, Conn.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa
Wilbur & Williams Co., 261 Park Square Bldg., Boston, Mass. (Molding Powder.)

MOLYBDENUM
American Electro Metal Corp., 65 Madison Ave., New York, N. Y.
Eisler Electric Corp., 770 So. 13th St., Newark, N. J.
Fansteel Products Co., Inc., North Chicago, Ill.
Lohfeld & Co., J. L., 53 Park Place., New York, N. Y.
Mallory & Co., P. R., 329 E. Washington, Indianapolis, Ind.
Palatine Industrial Co., 111 Fifth Ave., New York, N. Y.
Stirian Wire Co., 255 Sherman Ave., Newark, N. J.

Name Plates
ETCHED—ALL METALS
SERIAL PLATES
ETCHED AND LITHOGRAPHED
INSTRUMENT FACE PLATES
DIALS AND SCALES
RADIO ESCUTCHEONS AND METAL PANELS
General Etching & Mfg. Co.
3072-82 W. Grand Ave. Chicago, Ill.

MONEL METAL
International Nickel Co., 67 Wall, New York, N. Y.
MOTOR CONTROLLERS. See Controllers, Motor.
MOTOR PLATFORM BASES. See Bases, Motor Platform
MOTOR STARTERS. See Controllers, Motor; Switches, Remote Control; Switches, Motor Starting; Safety; Switches Snap (Heavy Duty).

MOTORS

Alternating Current	See S
Direct Current	See S
Motors, 1 Hp. up	See M
Motors Fractional Hp.	See F
Universal	See U

Actodector. See Roth Bros. Co., Div. of Century Electric Co
Advance Elec. Co., 4311 Maple Ave., St. Louis M D S ..
Allis-Chalmers Mfg. Co., Milwaukee, Wis. M .. S ..
Allis Co., Louis, Milwaukee, Wis. M .. S ..
American Elec. Motor Co., Cedarburg, Wis. M .. .. ..
Apex Elec'l Mfg. Co., 1067 E. 152nd, Cleveland .. F S U
Armor Elec. Mfg. Co., 1200 Hilliard, Erie, Pa. M .. .. ..
Baldor Elec. Co., 4352-C Duncan Ave. St. Louis M F S ..
B-Line. See Brown-Breckmeyer Co.
Bodine Elec. Co., 2254 W. Ohio, Chicago .. F S I U
Bogue Elec. Co., Chas. J., 152 King, New York M .. .. ..
Brown-Brockmeyer Co., Norwood Power Bldg., Dayton, O. M F .. ..
Burke Elec. Co., Erie, Pa. M F S U
B. T. See Allis Co., Louis.
B & B Mfg. Co., 812 Lafayette, Toledo, O. .. F .. ..
Century Elec. Co., 1806 Pine, St. Louis, Mo. M F S ..
Chandeysson Elec. Co., St. Louis, Mo. M .. S ..
Clark, Jr., Elec. Co., James, 800 E. Bergman, Louisville, Ky. M .. .. ..
Cleveland Armature Wks., 4732 St. Clair Ave., Cleveland, O. M .. S ..
Comet Elec. Co., 47 Union Trust Bldg., Indianapolis, Ind
Continental Elec. Co., 323 Ferry, Newark M .. S ..
Crocker-Wheeler Elec. Mfg. Co., Ampere, N. J. M .. .. ..
Cushman Elec. Co., 69 S. Main, Concord, N. H. M F S ..
Dieni Mfg. Co., Elizabeth, N. J. M F S ..
Diverter Pole. See Rochester Elec. Product Co.
Domestic Electric Co., Kent, O. .. .. S U
Dumore Co., 35 16th, Racine, Wis. .. F .. U
Eclipse. See Fidelity Elec. Co.
Edco. See Electro Dynamic Co.
Electric Machinery Co., Minneapolis, Minn. M .. S ..
Electric Products Co., 1725 Clarkstone Rd., Cleveland, O. .. ..
Electric Specialty Co., 221 South Stamford, Conn. M F .. ..
Electro Dynamic Co., Bayonne, N. J. M .. S ..
Emerson Electric Mfg. Co., 2015 Washington Ave., St. Louis, Mo. M F S U
Esco. See Electric Specialty Co.
Fairbanks-Morse & Co., 900 S. Wabash Ave., Chicago, Ill. M F .. ..
Fidelity Elec. Co., Lancaster, Pa. M F .. ..
Fitzgerald Mfg. Co., Torrington, Conn. .. F .. ..
Fynn Weichsel. See Wagner Elec. Corp.
Galvin Elec. Mfg. Co., 3314 S. Broadway, St. Louis, Mo. .. F .. ..
General Electric Co., Schenectady, N. Y. M F G ..
Gilbert Co., A. C., New Haven, Conn. .. F .. ..
Hamilton Beach Mfg. Co., Racine, Wis. .. F S ..
Hobart Bros. Co., Troy, O. M .. .. ..
Holtzer-Cabot Elec. Co., 125 Amory, Boston M F .. ..
Howell Elec. Motors Co., Howell, Mich. M F S ..
Ideal Elec. & Mfg. Co., Mansfield, O. M .. S ..
Imperial Electric Co., Akron, O. M .. .. ..
Janette Mfg. Co., 556 W. Monroe, Chicago .. F S ..
Jantz & Leist Elec. Co., Western Ave. & York, Cincinnati, O. M F .. ..
Kendrick & Davis Co., Lebanon, N. H. .. F S ..
Kimble Elec. Co., 634 N. Western Ave., Chicago M .. S U
Leland Elec. Co., Dayton, O. .. F S ..
L. E. See Leland Elec. Co.
Lincoln Elec. Co., Cleveland, Ohio. M .. S ..
Line-Weld. See Lincoln Elec. Co.
Linzee Elec. Motor Co., Mansfield, O. M .. .. ..
Mando Co., 911 State Tower Bldg., Syracuse, N. Y. (6-12-40 Volt only) .. F .. ..
Marathon Elec. Mfg. Co., 32 Island, Wausau, Wis. .. F .. ..
Marble-Card Elec. Co., Gladstone, Mich. M .. .. ..
Master Electric Co., Dayton, O. .. F S ..
MC. See General Electric Co.
Michigan Elec. & Mfg. Co., Lake Linden, Mich. .. F S ..
Norfolk. See Walter Elec. Mfg. Co.
North East Appliance Corp., 379 Lyell Ave., Rochester, N. Y. .. F .. U
Northwestern Mfg. Co., 486 Clinton, Milwaukee M .. .. ..
Ohio Elec. Mfg. Co., 5905 Maurice Ave., Cleveland, Ohio .. F S ..
O K. See Marathon Elec. Mfg. Co.
Osann Co., F., 245 Seventh Ave., New York M .. .. ..
Peerless Elec. Co., 740 W. Market St., Warren, O. M F S U
Polar Cub. See Gilbert Co., A. C.
Pow-R-Full. See Wagner Elec. Corp.
Reco. See Reynolds Electric Co.

Red Band. See Howell Elec. Motors Co.
Reliance Elec. & Engrg. Co., 1042 Ivanhoe Rd., Cleveland, O. M .. S ..
Reynolds Electric Co., 2650 W. Congress, Chicago .. F S ..
Robbins & Myers Sales, Inc., Springfield, O. M F S U
Roth Bros. & Co., Div. of Century Elec. Co., 1400 W. Adams, Chicago, Ill. M F S ..
Standard. See Robbins & Myers Co.
Star Elec. Motor Co., Miller St. & N. J. R. R. Ave., Newark, N. J. M .. S ..
Sterling Elec. Motors, Inc., Telegraph Rd. and Atlantic Blvd., Los Angeles, Cal. M .. S ..
Stow Mfg. Co., Binghamton, N. Y. M F S U
Sturtevant Co., 15 Devonshire (Hyde Park), Boston, Mass. M F S U
Sunlight Electrical Mfg. Co., Dana Ave., Warren, O. .. F S ..
Super Wick. See Master Elec Co
Switch Start. See Lincoln Elec. Co.
Troy Engine & Machine Co., Engberg's Div., St. Joseph, Mich. M .. S ..
Union Elec. Motor Mfg. Co., Hancock & Oxford Sts., Philadelphia, Pa. M F S ..
U. S. Elec. Mfg. Co., 200 E. Slauson Ave., Los Angeles M .. S ..
Valley Elec. Co., 4221 Forest Park Blvd., St. Louis, Mo. M .. S ..
Wagner Elec. Corp., 1955 Indiana Ave., St. Louis, Mo. M F S U
Walter Elec. Mfg. Co., Norfolk, Va. M .. S ..
Watson. See Allis Co., Louis.
Welco Uniframe. See Weschе Elec. Co., B. A.
Weschе Elec. Co., B. A., 1522 Vine, Cincinnati M F S ..
Westinghouse Elec. Mfg. Co., East Pittsburgh M F S ..
Woods Mach. Co., S. A., Boston. M F S ..
Zobell Elec. Motor Co., 94 South, Garwood, N. J. M .. S ..

NAME PLATES
See also Decalcomania
American Name Plate Co., 117 Imlay, Brooklyn, N. Y.
Angell Embossing Co., 37 Barney-Smith Co., Dayton, O.
Chandler Co., Springfield, Mass.
Continental-Diamond Fibre Co., Bridgeport, Pa.
Crowe Name Plate & Mfg. Co., 1749 Grace, Chicago, Ill.
Electro-Chemical Engraving Co., 52 Vanderbilt Ave., New York, N. Y.
Etched Products Corp., 90 Tenth, Long Island City, N. Y.
Etching Co. of America, 1520 Montana, Chicago, Ill.
General Etching & Mfg. Co., 3072 W. Grand Ave., Chicago Ill.
Grammes & Sons Inc., L. F., Allentown, Pa.
Mayer & Co., Geo. J., 36 S. Meridian, Indianapolis, Ind.
Mechanical Engraving Co., 130 Orchard, Newark, N. J.
Premier Metal Etching Co., 14th & Van Alst Ave., Long Island City, N. J.
Turner Brass Works, Sycamore, Ill.

NICKEL
American Mond Nickel Co., Century Bldg., Pittsburgh, Pa.
Driver-Harris Co., Harrison, N. J.
Eisler Electric Corp., 770 S. 13th St., Newark, N. J.
International Nickel Co., 67 Wall, New York, N. Y.
National-Harris Wire Co., Newark, N. J.
Seymour Mfg. Co., Seymour, Conn.
NICKEL WIRE CLOTH. See Cloth, Wire.

NOTCHING MACHINES, Armature
Ferracute Machine Co., Bridgeton, N. J.
Niagara Machine & Tool Wks., 637 Northland Ave., Buffalo, N. Y.

NUT SETTING MACHINES
Vim Electric Tool Co., 149 Broadway, New York, N. Y.
OHMMETERS. See Instruments, Laboratory Standard; also Instruments, Portable and Switchboard.
OIL CUPS. See Cups, Oil.
OIL-LESS BEARINGS. See Bearings, Oil-less.
OSCILLOSCOPES. See Instruments, Laboratory Standard

OVENS, Industrial and Laboratory
Annealing, Temper Drawing, Mold Baking, Vulcanizing, Drying, Conditioning, Enameling, Japanning, Vacuum Impregnating.
Argus Laboratories, Inc., 150 W. 22nd, New York, N. Y.
Bellevue Industrial Furnace Co., 2971 Bellevue Ave., Detroit, Mich.
Buffalo Fdry. & Machine Co., 1543 Fillmore, Buffalo N. Y. (Armature and Coil.)
Conran, Frederick M., 107 Colden, Newark, N. J.
Crawford Oven Co., 302 W. Water, New Haven, Conn. (Coil Driers.)
Despatch Oven Co., 622 Ninth, S. E., Minneapolis, Minn.
Detroit Sheet Metal Wks., 1341 E. Milwaukee Ave., Detroit, Mich.
Devine Mfg. Co., J. P., Mount Vernon, Ill.
Eberbach & Son Co., Ann Arbor, Mich. (Drying.)
Eisler Electric Corp., 770 S. 13th St., Newark, N. J.
Emerson Apparatus Co., Melrose, Mass. (Conditioning.)
Freas Thermo Elec. Co., 1206 Grove, Irvington, N. J.
Gehnrich Indirect Heat Oven Co., Long Island City, N. Y.
General Electric Co., Schenectady, N. Y.
Hayes, C. I., 129 Baker, Providence, R. I.
Heidbrink Co., 2633 Fourth Ave., S., Minneapolis, Minn.
Hynes & Cox Elec. Corp., 406 N. Pearl, Albany, N. Y.
"Jiffy." See Sioux Battery & Mfg. Co.
Kenworthy, Chas. F., 198 Piedmont, Waterbury, Conn.
Lydon Bros., 229 Colden, Jersey City, N. J.
Maehler Co., Paul, 2220 West Lake, Chicago, Ill.
Miho Co., 717 Sycamore, Cincinnati, O.
Sargent & Co., E. H., 155 E. Superior, Chicago, Ill.
Sioux Battery & Mfg. Co., Sioux City, Ia. (Battery.)
Steiner & Co., E. E. 197 E. Kinney St., Newark, N. J.
Stokes Machine Co., F. J., Tabor Rd. (Olney), Philadelphia.
Swartwout Co., 18522 Euclid Ave., Cleveland, O.
Thelco. See Freas Thermo Elec. Co.
Westinghouse Elec. & Mfg. Co., Mansfield, O.
Young Bros. Co., 6523 Mack Ave., Detroit, Mich.
OXIDES, Battery. See Chemicals, Battery.

PACKING
Cooke Seal Ring, Dept. A, 46 N. Green St., Chicago, Ill.
Federal Metallic Packing Co., Wakefield, Mass.
Holed-Tite Packing, Inc., 100 E. 42nd, New York, N. Y.
Packtite. See Federal Metallic Packing Co.

ZOBELL MOTORS
¼ TO 7½ H.P. STANDARD AND SPECIAL. ALTERNATING AND DIRECT CURRENT.
94 SOUTH AVE. GARWOOD, N. J.

DIEMOLDING CORP.
BAKELITE BEETLE DUREZ
PLASTIC MATERIALS MOLDED
WITH ENGINEERING SERVICE
Trade Mark
CANASTOTA, N. Y.

THE CHANDLER CO.
Etched NAME PLATES *Lithographed*
Embossings Stampings
Springfield, Mass.

Announcing A Substitute for Rubber!

We have recently been equipping Cooke Seal Rings with a new and highly successful gasket, made from a petroleum by-product, in place of rubber gaskets. We call it "Noswell." It has all the resiliency and expandability of rubber, yet it is unaffected by kerosene, benzol, gasoline or other liquids which ruin rubber. It has many applications, besides its use in our rings—gaskets, packing, washers—can be made of "Noswell." If you are using cork or leather where rubber—if you could use it—would be better—write us for prices and samples of "Noswell" today.

COOKE Seal Ring

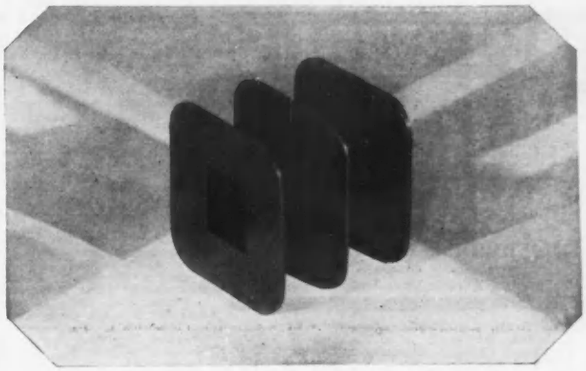
46 N. Green Street,
Chicago, Illinois
Dept. "A"

The Beacon

guiding you straight to porcelain satisfaction

Porcelain buying is not a gamble or a matter of guess work if you specify or insist upon geting STAR Quality. Star Porcelain is real quality and yet the price is as low as some inferior kinds. Let STAR Quality guide you

The STAR PORCELAIN COMPANY
TRENTON NEW JERSEY



Great Names in the Electrical Industry Use Norton Moulded Products

Not long ago, a famed American Electrical Manufacturer came to Norton Laboratories with a puzzling problem in plastic moulding. The problem, briefly stated, was to mould a part used in one of their electrical products, so accurate that when a fine wire was coiled on one half of the part, the exactly same number of strands could be automatically coiled on the other half.

Here indeed was a problem. The part must be moulded within the accuracy of two-one thousandths of an inch. Norton said it could be done—and set about to do it in production quantity. Today, this great company has placed many repeat orders for this part. They must be wholly satisfied with the result.

Many great names are contained in the blue book of Norton Clients. Gladly will we consult with you on your moulding problems. We have successfully served others and know that Norton Mouldings will more than please you.

Tell us your problem. Let us send full engineering data and prices. Address

NORTON LABORATORIES, INC.
DIV. 84 LOCKPORT, N. Y.

Norloc

Norton representatives may be reached in the following cities:

Rochester, N. Y.
Scofield Beach Mfg. Co.
423 Powers Building

Chicago, Ill.
Mr. W. M. Craig
228 North LaSalle St.

Bridgeport, Conn.
Mr. J. S. Berthold
1115 Main Street

Detroit, Mich.
W. H. Mark Hanna
6-247 General Motors Bldg.

Hillside, N. J.
Mr. A. C. Hall
1262 Miriam Place

IMPERVIOUS

INSULATING VARNISH

Electrical Insulating Varnishes and Compounds

IMPERVIOUS VARNISH CO.

Koppers Building
436 Seventh Avenue, Pittsburgh, Penna.

PAINT, Varnish, Lacquer

KEY
Varnishes, Insulating .....See V
Painting, Dipping, Spraying, Vacuum Impregnating.
Paint, Insulating and Acid Proof..See P
Lacquer, Metal Finishing .....See L

Acme White Lead & Color Wks., 5253 St. Aubin Ave., Detroit, Mich. L
Ajax. See Sherwin-Williams Co.
Alaks. See Lacquer & Chemical Corp.
American Di-Electrics, Ltd., Hancock and Bodine, Long Island City, N. Y. V
American Lastite Co., 3166 Lincoln Ave., Chicago.. P L
American Wurtzilite Co., Builders Bldg., Chicago .. P ..
Antakwa Co., 1229 Mohawk, Chicago, Ill..... P
Arizona Lacquer Mfg. Co., 7 16th, Brooklyn, N. Y. .. L
Armitage Co., John L., 245 Thomas, Newark, N. J. V ...
Armac. See Robertson Chemical Co.
Arolac. See Arizona Lacquer Mfg. Co.
Art-Craft. See Southwestern Paint & Varnish Co.
Atlantic Chemical Co., Colt, Irvington, N. J..... L
Atom Chemical Co., 96 E. 10th, New York, N. Y.. L
Ault & Wiborg Varnish Wks., 432 New, Cincinnati, O. V
Bakelite Corp., 247 Park Ave., New York, N. Y.. L
Benolite Varnish Co., 501 Columbia Bank Bldg., Pittsburgh ..... V P
Berry Bros., Leib & Wight, Detroit, Mich..... V
Billings-Chapin Co., 1163 E. 40th, Cleveland, O.. V
Biwax Corp., 208 S. La Salle St., Chicago, Ill... P
Bradley-Hurtz Co., 2620 S. Dearborn, Chicago, Ill. L
Bradshaw-Praeger & Co., 3248 W. 47th Pl., Chicago, Ill. V
Brevolite Lacquer Co., North Chicago, Ill..... L
Calman & Co., Emil, 42 Vernon Blvd., Long Island City, N. Y. ..... V P
Carboloid Products Corp., 98 Front, Brooklyn, N. Y. ..... V P
Chadeloid Chemical Co., 75 E 45th, New York. V
Chinalac. See Dolph Co., John C.
Cochrane Chemical Co., 422 Danforth Ave., Jersey City, N. J. ..... V P
Code 25. See Mitchell-Rand Mfg. Co.
Columbus Varnish Co., 264 Cozzens, Columbus, O. V
Comulac. See Martindale Elec. Co.
Continental-Diamond Fibre Co., Bridgeport, Pa. V
Doe & Co., Walter S., Kent, Ohio..... V
Dolph Co., John C., 168 Emmet, Newark, N. J.. V P
Duco. See Du Pont de Nemours & Co.
Du Pont de Nemours & Co., Wilmington, Del.. P
Durez. See General Plastics.
Eastman Kodak Co., Rochester, N. Y..... L
Eclipse Paint & Mfg. Co., Cleveland, O..... P
E. B. See Mitchell-Rand Mfg. Co.
Egyptian Lacquer Mfg. Co., 90 West, New York.. L
Electric Lacquer. See Dolph Co., John C.
Enamelac. See Robertson Chemical Co.
Ever-Brite Products Co., 517 Broadway, East Liverpool, O. L
Ferbert-Schorndorfer Co., 12815 Elmwood Ave., Cleveland, O. ..... V P I
Fesco. See Ferbert-Schorndorfer Co.
Five Point. See American Wurtzilite Co.
Franche & Co., 440 Orleans, Chicago, Ill..... L
General Elec. Co., Dept. M-327, Bridgeport, Conn. V P
General Plastics, Inc., 69 E. Walck Rd., N. Tonawanda, N. Y. V
George Co., P. D., St. Louis, Mo..... V
G. E. See General Elec. Co.
Glidden Co., Cleveland, O..... V P L
Glyptal. See General Electric Co., Schenectady.
H. B. See Mass & Waldstein.
Hilo Varnish Corp., Marcy & Flushing Aves., Brooklyn, N. Y. ..... V P L
Impervious Varnish Corp., 421 Wood, Pittsburgh. V P
Insulaterite. See Ohmlac Paint & Refining Co.
Insulvar. See Varflex Corp.
Irvington Varnish & Insulator Co., Irvington, N. J. V P L
Kodalak. See Eastman Kodak Co.
Krakles. See Brevolite Lacquer Co.
Lackerite. See Twin City Shellac Co., Inc.
Lacquer & Chemical Corp., 214-40th St., Brooklyn, N. Y. ..... P L
Laqueroid. See Glidden Co.
Liberty. See Antakwa Co.
Linolac. See Mica Insulator Co.
Lowe Bros. Co., 450 E. 3rd, Dayton, O..... V P
Lucas & Co., John, 223 Race, Philadelphia, Pa.. V P
Lucote. See Lucas & Co., John.
Maas & Waldstein, 430 Riverside Ave., Newark, N. J. L
Martindale Elec. Co., 1262 W. Fourth, Cleveland, O. V
Mawalac. See Maas & Waldstein.
Meco. See Henry V. Walker Co.
Mica Insulator Co., 200 Varick St., New York.... V
M. I. C. See Mica Insulator Co.
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y. V P
Nepto Lac. See Lowe Bros. Co.
Nikolas & Co., G. J., 1227 W. Van Buren, Chicago. L
O'Brien Varnish Co., South Bend, Ind..... V P L
Opex. See Sherwin-Williams Co.
Ozite. See Standard Underground Cable Co.
P. & B. See Ruberoid Co.

Dolphs

CHINALAK—A baking insulating varnish that *thoroughly dries*. Deep wound coils, dry from the *inside out*—not merely surface drying. Write for samples.

ELECTRIC LACQUER—Absolutely oil proof and water repellent. Can be brushed, sprayed or dipped. Gives a bright, glossy non-fading black finish and dries in 30 minutes.

JOHN C. DOLPH CO., 168 Emmett St., Newark, N. J.

Pecora Paint Co., 4th & Sedgeley Ave., Philadelphia, Pa. L
Pedigree. See George Co., P. D.
Peninsular Paint & Varnish Co., 1930 E. Milwaukee, Detroit, Mich. L
Peerless. See Maas & Waldstein.
Prismlac. See Maas & Waldstein.
Proxlin. See Acme White Lead & Color Wks.
Pruett-Schaeffer Chemical Co., Taber, Pittsburgh. .. P L
Reliable Leather Dressing Co., 43 Crescent, Long Island City, N. Y. V
Republic Varnish Co., 200 Thomas, Newark, N. J. V
Robertson Chemical Co., 9865 Meech Ave., Cleveland, O. ..... V P
R. P. C. See Ruberoid Co.
Schenectady Varnish Co., Schenectady, N. Y..... V
Schorndorfer, Ferbert, 12815 Elmwood Ave., Cleveland, O. ..... V P
Sherwin-Williams Co., Cleveland, O..... V P L
Sina. See Standard Insulation Co.
Sipe & Co., James B., Chamber of Commerce Bldg., Pittsburgh, Pa. L
Southwestern Paint & Varnish Co., 610 Broadway, Kansas City, Mo ..... V P
Standard Flexible Comp. Co., 5242 Lancaster Ave., Philadelphia, Pa. ..... V P
Standard Insulation Co., East Rutherford, N. J.... V
Standard Lacquer Co., 621 Broadway, New York. L
Standard Underground Cable Co., Div. of General Cable Corp., Pittsburgh, Pa. ..... P
Standard Varnish Wks., 443 44th Ave., New York. V P L
Sterling Varnish Co., Haysville, Pa..... V
Toch Bros., 443 4th Ave., New York..... V P L
Truscon Laboratories, Canift & Grand Trunk Railway, Detroit, Mich. V
Ultra. See Mitchell-Rand Mfg. Co.
Twin City Shellac Co., Inc., 338 Flushing Ave., Brooklyn, N. Y. ..... V P L
Varflex Corp., Rome, N. Y..... V
Voltax Co., 99 Reservoir Ave., Bridgeport, Conn. V P
Walpole. See Robertson Chemical Co.
Walker Co., Henry V., 17 John St., New York.. L
Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa. V P
Zapon Co., Stamford, Conn..... L
Zellac. See Zeller Lacquer Mfg. Co.
Zeller Lacquer Mfg. Co., 20 E. 49th, New York..... L

PANELS (panel) Engraving. See Engraving.
Radio (Metal). See Radio Mountings.
Radio (Molded). See Radio Molded Parts.
Radio (Hard Rubber) See Rubber Hard.
Meters. See Instruments, Portable & Switchboard

PAPER

Boxes. See Boxes & Wrappers.
Bushings. See Tubes, Paper.
Candles. See Candles, Fixture.
Cerea. See Tubes, Paper.
Fibre. See Cloth and Paper.
Fish. See Cloth & Paper.
Insulating. See Cloth and Paper.
Parchment. See Parchment Paper.
Shades. See Shades, Fabric.
Sleeves. See Tubes, Paper.

PARAFFINE. See Wax and Compounds.

PATENT ATTORNEYS

Sargent, Lester L., 1115 K Street, Washington, D. C.

PARCHMENT PAPER, Lamp Shade

Angel H. Reeve & Co., 7 Spruce, New York, N. Y.
Bergstrom Paper Co., Neenah, Wis.
Bradley Mfg. Co., A. J., 101 Beekman, New York, N. Y
Brown Paper Co., L. L., Adams, Mass
Chicago Rawhide Mfg. Co., 1237 Elston Ave., Chicago, Ill.
De Jonge & Co., Louis, 69 Duane, New York, N. Y.
New York & Penn Co., 200 5th Ave., New York, N. Y.
Paterson Parchment Paper Co., Passaic, N. J.
Raquette River Paper Co., Potsdam, N. Y.
Reeve & Co., Angel H., 7 Spruce, New York, N. Y.
Special Paper Mfg. Co., 90 Reade, New York, N. Y.
Strype, Fred C., 140 Lafayette, New York, N. Y.
Taylor-Logan Co., Holyoke, Mass.
Union Paper & Twine Co., 116 St. Clair Ave., N. W., Cleveland, O.
Warren Parchment Co., Dexter, N. Y.
Weber Co., F., 1220 Buttonwood, Philadelphia, Pa
West Carrollton Parchment Co., West Carrollton, O.
Windsor Locks Paper Mills Co., Windsor Locks, Conn.

PEGS, Armature

Bass & Sons, E. B., 5844 Grand Central Terminal Bldg. New York, N. Y.
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
National Vulcanized Fibre Co., Wilmington, Del.
Standard Fibre Products Co., 36 Pleasant, Watertown, Mass
White Supply Co., 4347 Duncan, St. Louis, Mo.

PENS, Scorching

Gilbert Supply Co., Independence, Iowa.
Little Speedster. See Gilbert Supply Co.
Post Elec. Co., 7 E. 44th, New York, N. Y.
Stylectric. See Post Electric Co.

PERFORATING MACHINES

American Perforator Co., 617 W. Jackson, Chicago, Ill.
Asam Bros., 917 Arch, Philadelphia, Pa.
Asam Wright. See Asam Bros.
Capital Novelty Co., Lincoln, Neb.
Cummings Co., B. F., 4740 Ravenswood Park, Chicago, Ill
Hamilton Engrs. Products Co., Hamilton, Ohio (Music Rolls).

PHENOLIC INSULATION. See Fibre, Phenol Also Molded Insulation.

PHENOL RESINOID MATERIALS. See Molded Insulations.

PHOSPHOR BRONZE

(Ingot, Rod, Sheet, Wire)
American Brass Co., Waterbury, Conn.
Anaconda. See American Brass Co.
Elephant Brand. See Phosphor-Bronze Smelting Co
Gilby Wire Co., Riverside Ave., Newark, N. J.
National-Harris Wire Co., Newark, N. J.
Omega. See Riverside Metal Co.
Phosphor-Bronze Smelting Co., 2200 Washington Ave., Philadelphia, Pa.
Riverside Metal Co., Riverside, N. J.
Seovil Mfg. Co., Waterbury, Conn.
Western Cartridge Co., East Alton, Ill.

PHOTO-ELECTRIC TUBES

Arcturus Radio Tube Co., 260 Sherman Ave., Newark, N. J. (Cell.)
Argco Laboratories, Inc., 150 W. 22nd, New York, N. Y.
Burt, R. C., 327 S. Michigan Ave., Pasadena, Cal
Electric B-G Products Co., Ithaca, Mich.
Foto Cell. See National Carbon Co.
General Electric Co., Schenectady, N. Y.
G-M Laboratories, Inc., Grace & Ravenswood Ave., Chicago.
Kino-Lamp. See Raytheon Mfg. Co.
McWilliams. See Electric B-G Products Co.
National Carbon Co., New York, N. Y.
Photion Instrument Corp., 574 Southern Blvd., New York.
Visitron. See G-M Laboratories, Inc.
Westinghouse Elec. & Mfg. Co., Mansfield, Ohio.

BREVOLITE LACQUERS

Lacquer Enamel, Spray or Dip
Air Dry Crystal—"Krakle"

BREVOLITE LACQUER CO.
formerly
WAUKEGAN CHEMICAL CO.
NORTH CHICAGO, ILL.

PHOTOMETERS, Lamp Testing

Biddle, James G., 1209 Arch, Philadelphia, Pa.
Edison Lamps Wks. of G. E. Co., (Nela Park) Cleveland, O.
Foote, Pierson & Co., 75 Hudson, Newark, N. J.
Holophane Co., 342 Madison Ave., New York, N. Y.
Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia, Pa.
Luxometer. See James G. Biddle
Mathews. See Foote, Pierson & Co.
National Lamp Wks. (Nela Park) Cleveland, O.

PICK-UPS, TALKING MACHINE. See Loud Speakers.

PIGTAILS, Commutator. See Brushes, Commutator.
Wire Gauze. See Brushes, Commutator.
Vacuum Cleaner. See Brushes for Vacuum Cleaners.

PINIONS. See Gears and Pinions.

PINION PULLERS. See Pullers, Armature Shaft.

PLASTICS. See Molded Insulation.

PLATES, Name. See Name Plates; Also Decalcomanis.
Fixture Outlets. See Fixture Fittings.
Storage Battery. See Plates, Storage Battery

Gray Instrument Co., 64½ W. Johnson, Philadelphia, Pa.

PLATES, Storage Battery

Ace Elec'l Corp., 211 E. Columbia, Fort Wayne, Ind.
Buss Structure Co., Buss Bldg., Springfield, Mass. (Steel.)
Champion. See Englert Mfg. Co.
C. & B. Battery Co., 1535 S. State, Chicago, Ill
Edes Mfg. Co., Plymouth, Mass.
Englert Mfg. Co., 2500 Jane, Pittsburgh, Pa.
Esto. See New Jersey Storage Battery Co.
Fort Wayne Battery Mfg. Co., 230 E. Fourth, Ft. Wayne.
Handler. See Witherbee Storage Battery Co.
Link & Hemrick, Inc., 555 W. 52nd St., New York, N. Y.
New Jersey Storage Battery Co., 656 Summit Ave., Union City, N. J.
Universal Battery Co., 3410 S. La Salle, Chicago, Ill.
Witherbee Storage Battery Co., 75 Columbus Ave., New York.

PLATING GENERATORS

American Giant. See Connecticut Dynamo Motor Co.
Bogue Elec. Co., Chas. F., 132 King, New York, N. Y.
Burke Elec. Co., Erie, Pa.
Chandeysson Elec. Co., St. Louis, Mo.
Columbia Elec. Mfg. Co., 1292 E. 53rd, Cleveland, Ohio.
Connecticut Dynamox Motor Co., Irvington, N. J.
Conpro. See Eager Elec. Co.
Eclipse. See Fidelity Elec. Co.
Electric Specialty Co., 229 South, Stamford, Conn.
Esco. See Electric Specialty Co.
Fidelity Elec. Co., Lancaster, Pa.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Hobart Bros. Co., Troy, O.
Holtzer-Cabot Elec. Co., 125 Amory, Boston, Mass.
Ideal Electric & Mfg. Co., East Third St., Mansfield, O.
Jantz & Leist Elec. Co., Western Ave. & York, Cincinnati.
Kendrick & Davis Co., Lebanon, N. H.
L'Hommedieu & Sons Co., Chas. F., 27 S. Clinton, Chicago, Ill.
Optimus. See Hanson-Van Winkle & Munning Co.
Reliance. See L'Hommedieu & Sons Co., Chas. F.
Roth Bros. & Co., Div. of Century Electric Co., 1400 W. Adams, Chicago, Ill.
Westinghouse Elec. Mfg. Co., East Pittsburgh, Pa.

PLATING AND FINISHING

Chromium Plating, Rust Proofing and other special metal-finishing processes.
Amaloy. See American Machine & Foundry Co.
American Machine & Foundry Co., 5520 Second Ave., Brooklyn, N. Y.
Atlantic Chemical Co., Colt, Irvington, N. J.
Benderite. See Parker Rust-Proof Co.
Chromalite. See Metals Protection Corp.
Diamond Chrome. See U. S. Chromium Corp.
Duro Chrome. See General Chromium Corp.
General Chromium Corp., 3220 Bellevue Ave., Detroit, Mich. (Chromium Plate.)
Ideal Plating & Polishing Co., 55 Branford, Newark, N. J.
Metals Coating Co. of America, 495 N. Third, Philadelphia.
Metals Protection Corp., 401 Michigan, Indianapolis, Ind.
Parker Rust-Proof Co., 2177 E. Milwaukee, Detroit, Mich.
Rochester Elec. Products Corp., 89 Allen, Rochester, N. Y.
United Chromium, Inc., 51 E. 42d, New York, N. Y.
Udylite Process Co., 3220 Bellevue Ave., Detroit, Mich. (Rust-Proof Finish.)
U. S. Chromium Corp., Wilkinsburg Sta., Pittsburgh, Pa.
Weisberg & Greenwald, 71 W 45th, New York, N. Y.

PLATINUM,

Sheet, Rod, Tubing, Wire.
American Platinum Wks., 241 New Jersey Railroad Ave., Newark, N. J.
Baker & Co., Inc., 54 Austin, Newark, N. J.
Bishop & Co., Platinum Wks., J., Malvern, Pa.
Collin Mfg. Co., E. F., 30 Court, Newark, N. J
Eisler Electric Corp., 770 S. 13th St., Newark, N. J.
Interstate Products Corp., 503 Mulberry, Newark, N. J.
Wilco. See H. A. Wilson Co.
Wildberg Bros., Smelting & Refining Co., 742 Market, San Francisco, Cal.
Wilson Co., H. A., Newark, N. J.

PLUG FUSES. See Fuses and Fuse Wire.

PLUG RECEPTACLES. See Receptacles, Plug.

PLUGS, Flashing. See Flashers, Sign.

PLUGS, Radio. See Radio Receiver Parts.

Patent and Profit by Your Inventions and Register Your Trade Marks

For Full Information Address
LESTER L. SARGENT
Registered Patent Attorney
1115 K Street, N. W. Washington, D. C.

OHIO reliable MOTORS

Every Ohio Fractional Horse Power Motor is as carefully designed and built as a 100,000 K.W. Generator and must pass 14 individual tests before it is given the Ohio name plate.

1/30 to 1 Horse Power

THE OHIO ELECTRIC MFG. CO.
5905 Maurice Avenue, Cleveland, Ohio
Formerly The Ohio Electric & Controller Co.

FOR every working day in 1929, there were 25 test reports compiled at E. T. L. One covered a span of 11 years.

The Electrical Industry's compass reads: **Know—*by Test***

ELECTRICAL TESTING LABORATORIES
80th St. and East End Ave., New York, N. Y.

Veriflex

Flexibility is the essential in Good Heater cord . . . It is the basis of Driver-Harris Central Station Grade.

Write for booklet "How to Judge Heater Cord."

Driver-Harris Company
Harrison, New Jersey

Not a casting in this new

WELD-BUILT MOTOR

(Direct Current)

. . . yet it is lighter and stronger with its structure made from rolled and electro-welded steel.

WELD-BUILT is an inter-pole, ball bearing equipped motor that, in every detail of construction, is made to the strict standards of ELECTRO DYNAMIC quality.

Bulletin No. 262 Is Completely Descriptive

ELECTRO DYNAMIC COMPANY, Bayonne, N. J.

50 years
BUILDING QUALITY MOTORS & GENERATORS

For PORCELAINS
that are
ACCURATE and
DEPENDABLE, write
COOK POTTERY CO.
Trenton, N. J.

CONTACT POINTS AND THERMOSTATIC METAL

BAKER Contact Points are made with the thought constantly in mind that, above all, contact points must function with unvarying reliability. We make them of platinum, iridio-platinum, silver and special alloys. Our thermostatic metal is made for high and for low temperatures. Baker Non-Rusting Thermostatic metal is for use where contact with steam or hot water is part of the problem.

BAKER & CO., INC.
54 Austin St. Newark, N. J.

Rheostats.
1. Air Heaters
2. Automatic Motor Starters.
3. D. C. Battery Charging Equipment.
4. Field Rheostats.
5. Laboratory Resistors and
6. Motor Starters and Controllers A. C. and D. C.
7. Radio Resistors and Rheostats.
8. Resistors for all purposes.
9. Rheostats for all purposes.
10. Speed Controllers.
11. Theatre Dimmers.

WARD LEONARD ELECTRIC CO.
31-41 South St. Mount Vernon, N. Y.

PLUGS, Attachment

A-1 Bakelite. See Connecticut Elec. Mfg. Co.
Ajax Elec. Specialty Co., 1926 Chestnut, St. Louis, Mo.
Alcor Mfg. Co., 4605 W. Madison, Chicago.
Alden Mfg. Co., Brockton, Mass.
Anselite Elec. Mfg. Co., New Haven, Conn.
Anylite Elec. Co., 200 Murray, Fort Wayne, Ind.
Arrow Electric Div. of Arrow-Hart & Hegeman Elec. Co. Hartford, Conn.
Arro-Grip. See Arrow Elec.
Beardsley & Wolcott Mfg. Co., Waterbury, Conn.
Beaver Mfg. Co., 625 N. Third, Newark, N. J.
Bee Ell Elec. Mfg. Co., 541 Broadway, New York, N. Y.
Belden Mfg. Co., 4631 W. Van Buren, Chicago, Ill.
(Special Soft Rubber Plug Furnished with Belden Cords).
Benjamin Elec. Mfg. Co., Des Plaines, Ill.
Ben Tap. See Benjamin Electric Mfg. Co.
Bryant Elec. Co., 1421 State, Bridgeport, Conn.
C. H. See Cutler-Hammer Mfg. Co.
Carling Tool & Machine Co., 618 Capital Ave., Hartford, Conn.
Cetlite. See Monowatt Elec. Co.
Cemco. See Connecticut Elec. Mfg. Co.
Circle F Mfg. Co., Trenton, N. J.
Colts Patent Fire Arms Mfg. Co., Hartford, Conn.
Connecticut Elec. Mfg. Co., Bridgeport, Conn.
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee.
DD. See Bryant Elec. Co.
Deal Electric Co., 453 Broome, New York, N. Y.
Diamond, H. See Hart Mfg. Co.
Dreadnaught. See Cutler-Hammer Mfg. Co.
Dubl-Duty. See Bryant Elec. Co.
Eagle Elec. Mfg. Co., 79 Hall, Brooklyn, N. Y.
Eastman Mfg. Co., Manitowoc, Wis.
Electric Co., 94 Allyn, Hartford, Conn
Ericson Mfg. Co., 3257 Bradford Rd., Cleveland, O
Euler Elec. Mfg. Co., 803 S. Adams, Marion, Ind.
York, N. Y.
Fitzall. See Rodale Mfg. Co.
Gaynor Electric Co., Inc., Stratford, Conn.
GE-Flex. See General Electric Co.
General Electric Co. Section D, 345, Bridgeport, Conn.
(Special Soft Rubber Plug furnished with G. E. Cords.)
Globe Metal Mfg. Co., 2122 E. Hazzard, Philadelphia, Pa
Gold Seal Elect. Co. of Ohio, Inc., 250 Park Ave., New
Gripall. See Beaver Mfg. Co.
Han-D-Cap. See National Appliance Co.
Handie Cap. See Beaver Mfg. Co.
Hart Mfg. Co., Hartford, Conn.
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co. Hartford, Conn.
Heetach. See Marks Products Co.
Hemco. See Bryant Electric Co.
Hoosick Falls Radio & Electrical Parts Mfg. Co., Hoosick Falls, N. Y.
H. & H. See Hart & Hegeman.
Hubbell, Inc., Harvey, Bridgeport, Conn.
Ilewill Sales & Mfg. Co., 1415 S. Broadway, Dayton, O.
Iliffy. See Euler Elec. Mfg. Co.
Kool Plug. See Colt's Patent Fire Arms Mfg. Co.
Leviton Mfg. Co., 226 Newell, Brooklyn, N. Y.
Marks Products Co., 90 N. Ninth, Brooklyn, N. Y.
Metropolitan Electric Mfg. Co., Blvd. at 14th St., Long Island City, N. Y.
Monowatt Electric Corp., 24 W. 40th, New York, N. Y.
National Appliance Co. (Div. of Reynolds Spring Co.) Jackson, Mich.
Nelco. See Nelson Elec. Co.
Nelson Elec. Co., Plant City, Fla.
P & S. See Pass & Seymour.
Paragon Elec. Sales Co., 215 S. Fifth, Philadelphia, Pa.
Pass & Seymour, Solvay Sta., Syracuse, N. Y.
Quartap. See Connecticut Elec. Mfg. Co.
Poloron Elec. Mfg. Corp., 26 Waverly Pl., New York, N. Y.
Propp Co., M., 554 Broadway, New York.
Quick Catch. See Hubbell, Inc., Harvey.
Real. See Smith & Co., T. C.
Real Diamond. See Smith & Co., T. C.
Reben Electric Mfg. Co., 2024 Gravesend Ave., Brooklyn, N. Y.
Reneo. See Reben Elec. Mfg. Co.
Reynolite Masterpiece. See National Appliance Co.
Ripple. See Bryant Elec. Co.
Rodale Mfg. Co. 206 Hudson, New York
Safegard Elec. Appliance Co., 1210 Samson, Philadelphia.
Samson-United Corp., Probert, Rochester, N. Y.
Sears, Henry D., 460 Boylston, Boston 11, Mass.
Simplex Div. of Edison General Elec. Appliance Co., Inc., 5600 W. Taylor, Chicago, Ill.
Smith & Co., T. C., 3915 Powelton Ave., Philadelphia, Pa.
Snapit. See Marks Products Co.
Snoco. See Snow & Co., E. W.
Snow & Co., E. W., Rochester, N. Y.
Spartanette. See Bryant Elec. Co.
Spar Tap. See Bryant Elec. Co.
Standard. See Cutler-Hammer Mfg. Co.
Suitzall. See Beaver Mfg. Co.
Surefit. See Alcor Mfg. Co.
Sure Grip. See Alden Mfg. Co.
T. E. C. See Electric Co
Tedco. See Paragon Elec. Sales Co.
Telltale Tap. See General Elec. Co.
Templus. See Bryant Elec. Co.
Torrid. See Beardsley & Wolcott Mfg. Co.
Trio-Tap. See Rodale Mfg. Co.
Triple Tap. See General Elec. Co.
Twin Tap. See General Elec. Co.
United States Elec. Mfg. Co., 222 W. 14th, New York
Victory. See Beaver Mfg. Company.
Weber. See Sears, Henry D.
Wellmade Elec. Mfg. Co., Torrington, Conn.
Wilshires. See Inma Co.
Yankee. See Beaver Mfg. Co.

POCKET METERS. See Instruments, Pocket.

POINTS, Contact

American Platinum Wks., 241 New Jersey Railroad Ave., Newark, N. J.
Baker & Co., Inc., 54 Austin, Newark, N. J. (Gold, Platinum, Silver.)
Bishop & Co., Platinum Wks., J., Malvern, Pa.
Coffin Mfg. Co., B. F., 30 Court, Newark, N. J. (Platinum and Silver.)
Cohn, Sigmund, 44 Gold, New York, N. Y. (Platinum.)
Eisler Electric Corp., 770 S. 13th St., Newark, N. J.
Fansteel Products Co., North Chicago, Ill.
General Plate Co., Attleboro, Mass.
Hardy Metal Corp., Seattle, Wash.
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.
Interstate Products Corp., 503 Mulberry, Newark, N. J. (Platinum and Silver.)
Mallory & Co., P. R., 329 E. Washington, Indianapolis, Ind.
National Contact Co., 33 W. 60th, New York. (Platinum.)
Nichoff & Co., C. E., 230 W. Superior, Chicago. (Platinum.
Spark-O-Metal. See Hardy Metal Corp.
Tungsten Electric Corp., 545 39th, Union City, N. J.
Wilco. See Wilson Co., H. A.
Wilson Co., H. A., Newark, N. J. (Platinum and Silver (Platinum and Silver.)

POLISHING MACHINES, WIRE. See Wire Polishing Machines.

PORCELAIN

Beads. See Beads, Insulating.
Bushings. See Bushings, Box & Cabinet.
Cement. See Cement, Liquid, Porcelain.
Insulators. See Porcelain.
Liquid. See Cement, Liquid Porcelain.
Molding Machine. See Presses, Porcelain Molding.
Reflectors (Enameled). See Reflectors, Porcelain Enameled.
Refractory. See Cores, Resistance Coil.
Tubes. See Porcelain.

PORCELAIN, Special Shapes

Akron Porcelain Co., Akron, Ohio.
American Porcelain Co., 329 E. Second, E. Liverpool, O.
A. P. See Akron Porcelain Co.
Burgess & Co., East Liverpool, O.
Central Porcelain Co., Columbiana, O
Challenge Stamping & Porcelain Co., Grand Haven, Mich.
Circle F Mfg. Co., Trenton, N. J.
Colonial Insulator Co., Akron, O.
Connecticut Porcelain Co., Trenton, N. J.
Cook Pottery Co., Trenton, N. J.
Corns China Co., Wellsville, O.
Crowley & Co., 1 Central Ave., West Orange, N. J.
Crowlite. See Crowley & Co.
Electrical Refractories Co., East Palestine, O.
Globe Porcelain Co., Mulberry St. and St. Joes Ave., Trenton, N. J.
Hartford Faience Co., Hartford, Conn.
Hub-Way Mfg. Co., Hubbard, Ohio.
Illinois Electric Porcelain Co., Macomb, Ill.
Imperial Porcelain Wks., Canal and Mulberry, Trenton, N. J.
Knox Porcelain Corp., Knoxville, Tenn.
Louthan Mfg. Co., East Liverpool, O.
Mercer Porcelain Co., Trenton, N. J.
Metsch Refractories Co., East Liverpool, Ohio.
National Porcelain Co., Trenton, N. J.
New Jersey Porcelain Co., Trenton, N. J.
Nu Blas. See Star Porcelain Co.
Pass & Seymour, Inc., Solvay Sta., Syracuse, N. Y
Porcelava. See Burgess & Co.
Porcelain Products, Inc., Findlay, Ohio.
Square D Company, Detroit, Mich.
Standard & Specialty Porcelain Co., Sun Prairie, Wis
Star Porcelain Co., Muirhead Ave., Trenton, N. J.
Stupakoff Laboratories, 6827 Hamilton Ave., Pittsburgh, Pa.
Thomas & Sons Co., R., Lisbon, O.
Trenle Porcelain Co., East Liverpool, Ohio.
Union Elec'l Porcelain Wks., Inc., Muirhead Ave., Trenton,
Washington Porcelain Co., Washington, N. J.

POROUS CUPS

Unglazed earthenware cups for primary (wet) batteries
Colonial Insulator Co., Akron, Ohio.
Maddocks Sons, John, Trenton, N. J.
Ohio Pottery Co., Zanesville, Ohio.
Robinson Clay Products Co., Akron, Ohio.

POSTS, Binding

Binding Posts, Switch Parts, Stop Points, Contacts Arms, Levers. See also Radio Mountings.
American Radio Hardware Co., 135 Grand, New York
Bunnell & Co., J. H., 32 Park Pl., New York, N. Y
Chapman Machine Co., Terryville, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Eby Mfg. Co., Inc., H. H., 22nd & Lehigh, Philadelphia.
Ensign. See Eby Mfg. Co., H. H.
Eureka. See Frank W. Morse Co.
Grammes & Sons, Inc., L. F., Allentown, Pa.
Gray Bros. Co., Piano, Ill.
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.
Hoosick Falls Radio & Electrical Parts Mfg. Co., Hoosick Falls, N. Y.
King. See Morse Co., Frank W.
Morse Co., Frank W., 289 Congress, Boston. (Spring Grip)
Nutmeg. See Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co.
Polk, J. L., 41 Bell Ave., Troy, N. Y.
Premier Elec. Co., 3800 Ravenswood Ave., Chicago, Ill.
Quality. See H. H. Eby Mfg. Co.

PORCELAIN—
In standard and special shapes. The right kind of porcelain for each application. Let us estimate.
MERCER PORCELAIN CO., Inc., Trenton, N. J.

Queen. See Morse Co., Frank W.
Thomaston Mfg. Corp., Thomaston, Conn.
Waterbury Button Co. (Elecl. Mfg. Dept.), Waterbury, Conn.

POTENTIOMETERS (Instruments). See Instruments, Laboratory Standard.

POTENTIOMETERS (Radio Control). See Radio Receiver Parts.

POWDERED CARBON. See Carbon, Powdered.

POWER TRANSMISSION CHAIN. See Chain, Power Transmission.

PRESS BOARD. See Cloth and Paper.

PRESSES, Armature Coil

Comstock Mfg. Co., Wilkes-Barre, Pa.

PRESSES, ARMATURE NOTCHING. See Notching Machines, Armature.

PRESSES, Molded Insulation

Burroughs Co., 246 N. Tenth, Newark, N. J.
Busch-Sulzer Bros. Diesel Engine Co., Second & Utah Sts., St. Louis, Mo.
Carver, Fred S., 90 West, New York, N. Y. (Hot Plates.)
Dunning & Boschert Press Co. 329 W. Water, Syracuse.
Duo-Press. See Busch-Sulzer Bros.
Elmes Engrg. Works, Chas. F., 230 N. Morgan, Chicago.
Evans Engrg. Works, Chas. E., 1002 Fulton, Chicago, Ill
Farquhar Co., A. B., York, Pa.
French Oil Mill Machinery Co., Piqua, O.
Southwark Fdy. & Mach. Co., 400 Washington Ave., Philadelphia, Pa.
Stokes Mach. Co., F. J., Tabor Rd. (Olney), Philadelphia.
Terkelsen Machine Co., Terkelsen Bldg., Boston, Mass.
Watson-Stillman Co., 75 West St., New York, N. Y.
Wood & Co., R. D., Florence, N. J.

PRESSES, Porcelain Molding

Baird, Andrew, 2715 Newark, Detroit, Mich

PRESSES, Punching and Bending

Bench Presses—Power Presses; for Punching & Stamping Sheet Metal.
American Can Co., 230 Park Ave., New York, N. Y.
ams Machine Co., Max, 101 Park Ave., New York, N. Y
Baird Machine Co., Bridgeport, Conn.
Bliss Co., E. W., 53rd St. & Second Ave., Brooklyn, N. Y
Cameo. See American Can Co.
Federal Press Co., Elkhart, Ind.
Ferracute Machine Co., Bridgeton, N. J.
Hyro Mfg. Co., 200 Varick, New York, N. Y.
Loshbough-Jordan Tool & Machine Co., Elkhart, Ind
Niagara Machine & Tool Wks., 637 Northland, Buffalo.
Peck, Stow & Wilcox Co., Southington, Conn.

PRESSES, Stamping. See Presses, Punching & Bending.

PRISMS. Chandelier. See Crystals, Chandelier

PROJECTOR LENSES. See Lenses.

PULLERS, Armature Shaft

Motor Pulley, Shaft & Pinion Pullers & Extractors
Allen Electric & Equipment Co., Kalamazoo, Mich.
Crane Puller Co., West Newton, Mass.
Columbia Machine Works & Malleable Iron Co., Atlantic Ave & Chestnut St., Brooklyn, N. Y.
Duff-Norton Mfg. Co., Pittsburgh, Pa.
Electric Service Supplies Co., 17th & Cambria Sts. Philadelphia, Pa.
Peerless. See Electric Service Supplies Co.
Premier Electric Co., 3800 Ravenswood Ave., Chicago, Ill.
Weidenhoff, Joseph, 4352 Roosevelt Rd., Chicago, Ill

PULLEYS, Composition

American Pulley Co., 4200 Wissahickon Ave., Philadelphia.
General Electric Co., Schenectady, N. Y
Ohio Valley Pulley Co., Maysville, Ky.
Rockwood Mfg. Co., 1801 English Ave., Indianapolis, Ind.
Sprucolite Co., Bloomfield, N. J.

PUMPS, Oil Burner

Janette Mfg. Co., 556 W. Monroe, Chicago, Ill
Milwaukee Tank Wks., Milwaukee, Wis.
Monroe Machine Tool Co., 737 W. Jackson Blvd., Chicago
Reflex. See Simplex Oil Heating Co.
Simplex Oil Heating Co., 1199 Eddy, Providence, R. I
Teesdale Mfg. Co., 427 Market, Grand Rapids, Mich

PUMPS, Vacuum

To Exhaust Incandescent Lamps.
Beach-Russ Co., 50 Church, New York, N. Y.
Bishop & Babcock Sales Co., 4901 Hamilton Ave., N. E., Cleveland, O.
Cenco. See Central Scientific Co.
Central Scientific Co., 460 E. Ohio, Chicago, Ill.
Dunham Co., C. A., 450 East Ohio, Chicago, Ill.
Elmer & Amend, 205 3rd Ave., New York, N. Y
Eisler Elec. Corp., 770 S. 13th, Newark, N. J.
General Electric Co., Schenectady, N. Y.
Hubbard's Sons, Norman, 1 Carlton Ave., Brooklyn, N. Y.
Megavac. See Central Scientific Co.
Packard. See Hubbard's Sons, Norman.

PUNCHING PRESSES. See Presses, Punching.

PUNCHING and BENDING, Sheet Steel

Anderson Mfg. Co., Albert & J. M., 289 A, Boston, Mass

RACKS, Wire Reel

(With Tension Device Attached).
Armature Coil Equipment Co., 2415 Forestdale Ave., Cleveland, Ohio.
Browning See Mutual Foundry & Machine Co.
Chapman Elec'l Wks., P. E., 1326 Chouteau Ave., St. Louis Mo. (Tensionless Dereeler)
Columbia Machine Tool Works & Malleable Iron Co., Atlantic Ave. and Chestnut St., Brooklyn, N. Y.
Comstock Mfg. Co., Wilkes-Barre, Pa.
Electric Service Supplies Co., 17th & Cambria Sts. Philadelphia, Pa.
General Elec. Co., Schenectady, N. Y. (Tension Indicator.)
Mutual Foundry & Machine Co., Atlanta, Georgia.
Segur. See Electric Service Supplies Co.

RADIO CIRCUIT COMPONENTS

This heading includes Inductances (Coils), Capacitors (Condensers), Fixed Resistances, Grid Leaks, Transformers, Choke Coils, and Filters, also Amplifier Units and Kits.

Pedigree Insulating Varnish

MIGHTY ARMOR

Every exposed surface in electrical equipment shares the costly danger of tiny, unprotected spots.

PEDIGREE Varnishes make them impregnable to the action of heat, moisture, acids and alkalies.

Its closely knit base particles have the greatest dielectric strength.

The resourceful Chemical Research and Engineering Departments of the P. D. George Company invite your specific problems.

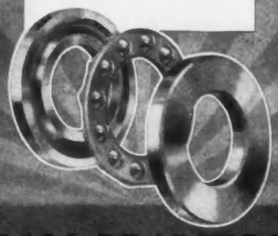
Samples and descriptions sent on request.

THE P. D. GEORGE COMPANY
SAINT LOUIS MISSOURI

AETNA THRUST BALL BEARINGS

This is an age of specialization. And—because we are specialists in the production of fine Thrust Ball Bearings — manufacturers send us their blue prints, knowing that they can always depend upon "precision to specifications."

Be sure you have the latest Aetna catalog.



AETNA BALL BEARING MFG. CO.
4600 SCHUBERT AVENUE
CHICAGO, ILLINOIS

Do You Know!

That Leland sleeve bearing motors are equipped with bearings that seldom or never require renewal; that a continuous filtering process of lubrication supplies clear, clean oil for a period of from one to three years without renewal; that, due to a film of oil constantly maintained between shaft and bearing, the two never touch?

These are some of the reasons why Leland motors rarely heat, altho often run continuously under loads far in excess of name plate rating.

A.C. Repulsion Induction
D.C. Compound Wound
A.C. Polyphase

All In Interchangeable Frames

1/8 1/6 1/4 1/3 1/2 3/4 1 1½ 2 3

THE LELAND ELECTRIC CO.
DAYTON · OHIO · U·S·A

Leland Motors

RADIO CIRCUIT COMPONENTS—Continued
Acme Appar. Corp., 39 Osborne, Cambridge, Mass.
Acme Products Co., Boston, Mass.
Acme Wire Co., New Haven, Conn.
Aero-Call. See Aero Products, Inc.
Aerovox Wireless Corp., 80 Washington, Brooklyn, N. Y.
Aero Products, Inc., 4611 Ravenswood Ave., Chicago, Ill
Ajax Elec. Specialty Co., 1926 Chestnut, St. Louis, Mo.
Ajax Elec. Specialty Co., St. Louis, Mo.
Akra-Ohm. See Shallcross Mfg. Co.
Alden Mfg. Co., Springfield, Mass
Allen-Bradley Co., 493 Clinton, Milwaukee, Wis.
Amerchoke. See American Transformer Co.
American Apparatus Co., Richmond, Ind
American Transformer Co., 178 Emmet, Newark, N. J.
Amperite Rheostat. See Radiall Co.
Amrad Corp., Medford, Hillside, Mass. (Electrolytic Condensers.)
Arco Elec'l Corp., 211 E. Columbia, Fort Wayne, Ind.
Arctic. See Premier Elec. Co.
Art Dial. See Pilot Radio & Tube Corp.
Audioformer Transformer. See Pacent Electric Co.
Autoformer. See Thordarson Elec. Mfg. Co.
Automatic Oil Heat Co., 9294 E. Fourth, St. Paul, Minn.
Automotive Parts Mfg. Co., 70 Washington St., Brooklyn.
B-Conomiser. See Pilot Radio & Tube Corp.
Benjamin Elec. Mfg. Co., Des Plaines, Ill.
Bonine. See Turn-It Radio Sales.
Branson Co., Chas. A., 299 Ellicott, Buffalo, N. Y.
Brooklyn Metal Stamping Corp., 718 Atlantic Ave., Brooklyn, N. Y.
Browning-Drake Corp., Calvary, Waltham, Mass.
Buffer. See Aerovox Wireless Corp.
Buffalo. See De Jur-Amsco Corp.
Campbell Electric Mfg. Co., 15 Stewart, Lynn, Mass.
Capacigrad. See Pilot Radio & Tube Corp.
Cardwell Mfg. Corp., Allen D., 81 Prospect, Brooklyn, N. Y.
Carter Radio Co., 407 S. Aberdeen, Chicago, Ill.
Central Radio Corp., Beloit, Wis.
Centraline. See Pilot Radio & Tube Corp.
Certified Condenser. See Radio Condenser Co.
Chelten Elec. Co., 4859 Stenton Ave., Philadelphia, Pa.
Clarostat Mfg. Co., 281 N. Sixth, Brooklyn, N. Y. (Radio Resistance.)
Cleveland Steel Products Corp., 7306 Madison Ave., Cleveland, O.
Cole Radio Mfg. Corp., 536 Bloomfield Ave., Bloomfield, N. J
Concertone. See Chicago-Jefferson Fuse.
Connectorals. See Alden Mfg. Co.
Continental Carbon, Inc., 13904 Lorain, Cleveland, O.
Continental. See Gardiner & Hepburn, Inc
Cornell Elec. & Mfg. Co., Anable & Rawson, Long Island City, N. Y.
Cresradio Corp., 166-32 Jamaica Ave., Jamaica, N Y
Croft. See Premier Elec. Co.
Cub. See Cornell Electric & Mfg. Co.
Daven Co., 158 Summit, Newark, N. J. (Kits)
Davohn. See Daven Co.
DeForest Radio Co., Passaic, N. J.
De Jur-Amsco Corp., Broome and Lafayette Sts., New York, N. Y.
Diamond Weave Coil. See Sickles Co., F. W.
Dongan Elec. Mfg. Co., 2985 Franklin, Detroit, Mich.
Dubilier Condenser Corp., 342 Madison av., New York
Dumont Elec. Co., 40 W. 17th, New York, N. Y.
Duratran. See Dubilier Condenser Corp.
Durham & Co., 1936 Market, Philadelphia, Pa.
Dynohmic. See Lynch, Inc.
Eagle Elec. Mfg. Co., 79 Hall, Brooklyn, N. Y.
Electrad, Inc., 173 Varick, New York, N. Y.
Electrical Research Laboratories, 2500 Cottage Grove Ave Chicago, Ill.
Electro Motive Engineering Corp., 127 W. 17th, New York.
Elkay. See Langbein Kaufman Radio Co.
El Menco. See Electro Motive Engineering Co.
Equamatic Kit. See Karas Elec. Co.
Equitrol. See Cardwell Mfg. Corp.
E-Z. See Polymet Mfg. Corp.
Faradon. See Wireless Specialty Apparatus Co.
Fast Co., John E., 3123 N. Crawford, Chicago, Ill.
Ferranti, Inc., 130 W. 42nd, New York, N. Y.
Filatrol. See De Jur-Amsco Corp.
Filterettes. See Tobe Deutschmann Co.
Fleichheim Co., A. M., 138 Liberty, New York, N. Y.
Ford Radio & Mica Corp., 110 Bleecker, New York, N. Y
Frost, Inc., Herbert H., 1142 W. Beardsley, Elkhart, Ind
Furnell Die Cast Condenser Corp., 16 Hudson, New York
F. & H. Radio Laboratories, Fargo, N. D.
Gardiner & Hepburn, Inc., 611 Widener Bldg., Philadelphia, Pa.
General Instrument Corp., 225 Varick, New York, N Y
General Mfg. Co., 8066 S. Chicago Ave., Chicago, Ill. (Coils.)
General Radio Co., 30 State Cambridge, Mass
General Transformer Corp., 910 W. Jackson Blvd., Chicago.
General Winding Co., 214 Fulton, New York, N. Y.
Gen-Win. See General Winding Co
Ger-Alt Radio Laboratories, 859 Flatbush Ave., Brooklyn, N. Y. (Adapter.)
Glastor. See Daven Co.
Globar Corp., Niagara Falls, N. Y.
Glo-Dial. See Wireless Radio Corp
Gray & Danielson Mfg. Co., 2101 Bryant, San Francisco, Cal.
Halldorsen Co., 4745 N. Western Ave., Chicago, Ill.
Hammarlund Mfg. Co., 424 W. 33rd, New York, N. Y.
Hardwick, Hindle, Inc., 215 Emmett, Newark, N. J.
Harmonik. See Karas Elec. Co.
Hedgehog Transformer. See Premier Elec. Co
Heinemann Elec. Co., Penn. Ave. & Plum, Trenton, N. J.
Hi-Q Kit. See Hammarlund.
Hum-Dinger. See Clarostat Mfg. Co.
Hy-Wat. See Electro Motive Engineering Corp.
Igrad Condenser & Mfg. Co., 4322 Lake Ave., Rochester, N. Y.
Infra-Dyne. See Gray & Danielson Co.
International Resistance Co., 2006 Chestnut, Philadelphia, Pa
Isograd, Isoleak. See Pilot Radio & Tube Corp.
Jefferson Electric Co., 1500 S. Laflin, Chicago, Ill.
J-M-P. Mfg. Co., 3329 Fond du Lac Ave., Milwaukee, Wis
Karas Elec. Co., 4040 N. Rockwell, Chicago, Ill
Kenyon Transformer Co., 122 Cypress Ave., New York, N. Y
Kilograd. See Pilot Radio & Tube Corp.
Krobiack. See Mountford, C. E.
Kuprox. See Kodel Radio Corp.
Langbein-Kaufman Radio Co., 62 Franklin, New Haven, Conn
Lavite. See Aerovox Wireles Corp.
Lautz Mfg. Co., 245 N. J. R. R. Ave., Newark, N. J (Radio Resistance).
Leakandenser. See Daven Co.
Lekeless. See Benjamin Elec. Mfg. Co.
Lemnis. See General Winding Co.
Loftin-White. See Hammarlund Mfg. Co.
Loless. See Wireless Radio Corp.
Lynch, Arthur H., 1775 Broadway, New York, N. Y.
Marco. See Martin-Copeland Co.
Martin-Copeland Co., 101 Sabin, Providence, R. I.
Maxitran. See Electrical Research Laboratories.
Mayo Laboratories, Inc., 281 E. 137th, New York, N. Y.
Marion Elec. Mfg. Co., 24 Cliff, Jersey City, N. J.
Mayolian Corp., 1668 Webster Ave., New York, N. Y (Tone Filter.)

Meggit. See Cole Mfg. Corp.
Melcoupler. See Robertson-Davis Co.
Meloformer. See Robertson-Davis Co.
Mershon. See Amrad Corp.
Metalnas. See Dubilier Condenser Corp.
Metralign. See General Instrument Corp.
Micadon Condenser. See Dubilier Condenser Corp.
Micamold Radio Corp., 1087 Flushing Ave., Brooklyn, N. Y (Amplifier Kit.)
Mica-Static. See Dubilier Condenser Corp.
Micon Condenser. See Dubilier Condenser Corp
Microcondenser. See Sterling Mfg. Co.
Micrograd. See Pilot Radio & Tube Corp.
Micrometric. See Karas Elec. Co.
Microstat. See Premier Elec. Co.
Midline. See Hammarlund Mfg. Co.
Mignon Electric Corp., 909 Genesee, Buffalo, N. Y.
Mountford, C. E., 30 Sullivan, New York, N. Y.
Muter Co., Leslie F., 8440 S. Chicago Ave., Chicago, Ill. (Amplifier Kits.)
National Co., 61 Sherman St., Malden, Mass.
Neutro-Grad. See Pilot Radio & Tube Corp.
New York Coil Co., Mount Clare, Pa.
Nutmeg. See Hart & Hegeman Mfg. Co.
Ohio Carbon Co., 12508 Almira Ave., Cleveland, O.
Ohmite Mfg. Co., 633 N. Albany Ave., Chicago, Ill. (Resistance.)
Orthometric. See Karas Elec. Co.
Orthophonic. See De Jur-Amsco Corp.
Pacent Electric Co., 91 7th Ave., New York, N. Y.
Pam. See Samson Elec. Co.
Panatrol See Wireless Radio Corp.
Perry Elec'l Resistor Corp., 289 New Main St., Yonkers, N. Y.
Phasatrol. See Electrad, Inc.
Philmore Mfg. Co., 106 7th Ave., New York, N. Y.
Pierce Airo. See United Scientific Laboratories.
Pierce Mfg. Co., 6225 W. Jackson Blvd., Chicago, Ill.
Pilot Radio & Tube Corp., 323 Berry, Brooklyn, N. Y.
Pilotran. See Pilot Radio & Tube Corp.
Potter Mfg. Co., North Chicago, Ill. (Electro-Chemical Condensers.)
Polymet Mfg. Corp., 829 E. 134th St., New York, N. Y
Power Box. See Scott Sales Co.
Powerohm. See International Resistance Co.
Powrad, Inc., 121 Ingraham, Brooklyn, N. Y.
Precision Coil Co., 122 Greenwich, New York, N. Y.
Precise Mfg. Corp., 254 Mill, Rochester, N. Y.
Premier Elec. Co., 3300 Ravenswood Ave., Chicago, Ill
Protectorald. See Alden Mfg. Co.
Pyrohm. See Aerovox Wireless Corp.
Radiall Co., 50 Franklin, New York, N. Y.
Radio Appliance Corp., Springfield, Mass.
Radio Condenser Co., Thorn & Copewood, Camden, N. J
Radio Engrg. Laboratories, 100 Wilbur Ave., Long Island City, N. Y (Short Wave Kit.)
Radioloc Switch. See Cutler-Hammer Mfg. Co.
Radio Receptor Co., 106 7th Ave., New York.
Radiostat. See Allen-Bradley Co.
Raola. See Modern Elec. Mfg. Co.
Receptrad. See Radio Receptor Co.
Reesonator. See F. & H. Radio Laboratories.
Remler. See Gray & Danielson Co.
Resistaformer. See Aerovox Wireless Corp.
Resistograd. See Pilot Radio & Tube Corp.
Rittenhouse Co., A. E., Honeoye Falls, N. Y. (Sole Selling Agent), Hatheway & Co., 16 Hudson, New York, N. Y
Roberts Condenser. See Hammarlund Mfg. Co.
Roberston-Davis Co., 363 W. Superior, Chicago, Ill.
Samson Elec. Co., Canton, Mass. (TRF Kits.)
Sangamo Electric Co., Springfield, Ill. (Transformers & Condensers.)
Scovill Mfg. Co., Waterbury, Conn.
Sensory. See Heinemann Electric Co.
Sevison Magneto Engr. Co., 379 Phillips Ave., Toledo, O.
Shallcross Mfg. Co., 700 Parker Ave., Collingdale, Pa.
Sickles Co., F. W., 130 Union, Springfield, Mass.
Signal Elec. Mfg. Co., Menominee, Mich.
Silver-Marshall, Inc., 6401 W. 65th St., Chicago. (Amplifier Kits.)
Silvertone. See Radio Receptor Co.
S. L. S. See Wireless Radio Corp.
S. L. T. See General Instrument Corp.
Solitmeter See Premier Electric Co.
Sprague Specialties Co., North Adams, Mass.
Standard Transformer Co., Dana Ave., Warren, O.
Sta-Put. See Martin-Copeland Co.
Sterling Mfg. Co., 2831 Prospect Ave., Cleveland, O
Stromberg-Carlson Tel. Mfg. Co., Rochester, N. Y.
Submariner. See J-M-P Mfg. Co.
Super Multiformer. See Precise Mfg. Corp
Supertran Transformer. See Ford Radio & Mica Co.
Symphony. See Modern Elec. Mfg. Co.
Synergodenser. See Precise Mfg. Corp.
Telemonic Coil. See Condenser Corp. of America.
Telos Coil. See Condenser Corp. of America
Thomas Engineering & Mfg. Co., 616 S. Michigan Ave., Chicago, Ill. (Condensers.)
Thompson-Levering Co., 351 N. 57th, Philadelphia, Pa.
Thordarson Elec. Mfg. Co., 500 W. Huron, Chicago, Ill.
Tobe Deutschman Co., Canton, Mass.
Tone Control. See Sprague Specialties Co.
Transcript-Clapp Kit. See Samson Electric Co.
Truphonic Amplification. See Alden Mfg. Co.
Tunadarta. See Lynch, Arthur H
Tung-Sol Condensers, Inc., 2317 Calumet Ave., Chicago, Ill. (Electrolytic Condensers.)
Twin-aud. See Peerless Radio Co.
Twin-Eight Transformers. See Bodine Electric Co.
Ultra Varis. See Bruno Radio Corp
Univernier Condenser. See Auburn Button Works.
Universal Electro Chemical Corp., 30 W. 15th, New York.
Universal Winding Co., Boston, Mass.
Valley Appliances, Inc., 634 Lexington Ave., Rochester, N. Y.
Variall Condenser. See Muter Co.
Volta. See Universal Electro Chemical Corp.
Volumgrad. See Pilot Radio & Tube Corp.
Walbert Radio Corp., 1000 Fullerton Ave., Chicago, Ill.
Ward Leonard Electric Co., 31 South, Mount Vernon, N. Y.
Wireless Radio Corp., Varick Ave. & Harrison Pl., Brooklyn, N. Y.
Wireless Specialty Apparatus Co. (J. P.), Boston, Mass

RADIO HARDWARE. See Radio Mountings.

RADIO MOUNTINGS

Coil Mountings, Coil Sliders and Rods, Switches, Detectors, Detector and Grid Leak Mountings, Panel Brackets, Special Radio Hardware & Trimmings, Metal Dials, Metal Panels, etc.

Aerovox Wireless Corp., 80 Washington, Brooklyn, N. Y.
Alden Mfg. Co., Brockton, Mass.
American Emblem Co., Utica, N. Y.
American Radio Hardware Co., 135 Grand, New York
Bonzo. See Haydon & Haydon.
Carborundum Co., Niagara Falls, N. Y. (Detector)
De Jur-Amsco Corp., Broome and Lafayette Sts., New York, N. Y.
Chapman Machine Co., Terryville, Conn.
Durham & Co., 1936 Market, Philadelphia, Pa.
Electrad, Inc., 173 Varick, New York, N. Y.

Etched Products Corp., 90 Tenth, Long Island City, N. Y. (Metal Panels.)
Eureka. See Morse Co Frank W.
General Etching & Mfg. Co., 3073 West Grand Ave., Chicago, Ill. (Metal Panels & Escutcheons.)
Globe Technolian Corp., Reading, Mass.
Glodial. See Wireless Radio Corp.
Hart & Hegeman Mfg. Co., Hartford, Conn.
Haydon & Haydon, 167 Chambers, New York, N. Y.
Master Engineering Co., 771 Mather, Chicago, Ill.
Morse Co., Frank W., 291 Congress, Boston, Mass.
Muter Co., Leslie F., 8440 S. Chicago Ave., Chicago.
Na-Ald. See Alden Mfg. Co.
Union Insulating Co., 296 Broadway, New York, N. Y.
Waddell Mfg. Co., Grand Rapids, Mich.
Wireless Radio Corp., Varick Ave. & Harrison Pl., Brooklyn.
Yaxley Mfg. Co., 1528 W. Adams, Chicago, Ill.

RADIO PANEL ENGRAVING. See Engraving, Radio Panel.

RADIO RECEIVER PARTS

Rheostats, Sockets, Plugs, Jacks.

Acme Elec. & Mfg. Co., 1439 Hamilton Ave., Cleveland, O.
Alden Mfg. Co., Springfield, Mass.
Allen-Bradley Co., 493 Clinton, Milwaukee, Wis.
Amacostat. See American Apparatus Co.
American Apparatus Co., Richmond, Ind.
Automotive Equipment Co., 317 Halsey, Newark, N. J.
B. M. S. See Brooklyn Metal Stamping Corp.
Beaver Mfg. Co., 625 N. Third, Newark, N. J. (Multiple Plugs.)
Benjamin Elec. Mfg. Co., Des Plaines, Ill.
Brach Mfg. Corp., L. S., 120 Sussex Ave., Newark, N. J.
Brooklyn Metal Stamping Corp., 718 Atlantic Ave., Brooklyn.
Cabelag. See Jones, Howard B.
Carter Radio Co., 407 S. Aberdeen, Chicago, Ill. (Also Socket Adapters.)
Central Radio Laboratories, 14 Keefe Ave., Milwaukee.
Centralab. See Central Radio Laboratories.
Cinch Mfg. Corp., 2335 W. Van Buren, Chicago, Ill.
Clarostat Mfg. Co., 285 N. Sixth, Brooklyn, N. Y.
Cle-Ra-Tone. See Benjamin Elec. Mfg. Co.
D. A. Radio Co., 30 Hollister, Buffalo, N. Y
De Jur-Amsco Corp., Broome and Lafayette Sts., New York, N. Y.
Dongan Elec. Mfg. Co., 2985 Franklin, Detroit, Mich.
Duostat. See De Jur-Amsco Corp.
Dynofilter Mfg. Co., 1022 E. 178th, New York, N. Y. (Interference Eliminator).
E-Z. See Polymet Mfg. Corp.
Eby Mfg. Co., H. H., 22nd & Lehigh Ave., Philadelphia.
Electrad, Inc., 173 Varick, New York, N Y
Electrical Insulation Corp., 308 W. Washington, Chicago.
Fantail Plug. See Brooklyn Metal Stamping Corp.
Frost, Herbert H., 1142 W. Beardsley, Elkhart, Ind.
Gem Jac. See Frost, Herbert H.
General Instrument Corp., 225 Varick, New York, N Y
General Radio Co., 30 State, Cambridge, Mass.
Gray & Danielson Mfg. Co., 2101 Bryant, San Francisco, Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn
Heinemann Elec. Co., Penn Ave. & Plum, Trenton, N. J.
Imp. See Carter Radio Co.
Jones, Howard B., 1300 Wabansia, Chicago. (Multiple Plug)
Martin-Copeland Co., 101 Sabin, Providence, R. I.
Microgrid. See Pilot Radio & Tube Corp.
Modu-Plug. See Central Radio Lab.
Morse Co., Frank W., 291 Congress, Boston, Mass.
Muter Co., Leslie F., 8440 S. Chicago Ave., Chicago.
Nutmeg. See Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co.
Pacent Elec. Co., 91 Seventh Ave., New York, N. Y.
Pan-Tab Jack. See Frost, Herbert H.
Philmore Mfg. Co., 106 Seventh Ave., New York, N. Y
Pilot Radio & Tube Corp., 323 Berry, Brooklyn, N. Y.
Polymet Mfg. Corp., 829 E. 134th St., New York, N. Y.
Premier Elec. Co., 3300 Ravenswood Ave., Chicago, Ill.
Recto Mfg. Co., Appleton & B.&O. R.R., Cincinnati, O.
Robertson-Davis Co., 361 W. Superior, Chicago, Ill.
Royalty. See Electrad, Inc.
Samson Elec. Co. Canton, Mass.
Shallcross Mfg. Co., Collingdale, Pa.
Socostat. See D. A. Radio Co.
Tubestat. See Muter Co.
Wireless Radio Corp., Varick Ave. & Harrison Pl., Brooklyn
Workrite Radio Corp. 1838 E. 30th, Cleveland, O.
Yaxley Mfg. Co., 1528 W. Adams, Chicago, Ill.

RADIO RECTIFIER TUBES

Armstrong Electric Co., 187 Sylvan Ave., Newark, N. J.
Arcturus Radio Tube Co., 260 Sherman Ave., Newark, N. J
Audion. See De Forest Radio Co.
Cable Radio Tube Corp., 80 N. Ninth, Brooklyn, N. Y.
Ceco Mfg. Co., 1200 Eddy, Providence, R. I.
Robertson-Davis Co., 363 W. Superior, Chicago, Ill.
Cunningham, Inc., E. T., 370 Seventh Ave., New York, N. Y.
Daven Co., 158 Summit, Newark, N. J.
DeForest Radio Co., Passaic, N. J.
Diamond Electric Co., Newark, N. J.
Diamond Vacuum Products Co., 4053 Diversey Ave., Chicago
Diatron. See Diamond Vacuum Products Co.
Eveready Raytheon. See National Carbon Co.
Gold Seal Electrical Co. of Ohio, Inc., 250 Park Ave., New York, N. Y.
Hygrade Lamp Co., Salem, Mass.
Hytron Corp., Salem, Mass.
Jaeger Research Laboratories, 280 Park Ave., Weehawken, N. J.
Ken-Rad Tube & Lamp Corp., Owensboro, Ky.
National Carbon Co., New York, N. Y.
National Radio Mfg. Co., 1020 S. Central Park Ave., Chicago, Ill.
Neptron. See Hygrade Lamp Co.
Northern Mfg. Co., 367 Ogden, Newark, N. J.
Paramount Mfg. Co., 79 Orange, Newark, N. J.
Pentode. See Ceco Mfg. Co.
Perryman Electric Co., 4901 Hudson Blvd., North Bergen, N. J.
Radio-Victor Corp. of America, 233 Broadway, New York.
Specialty Appliance Co., 6611 Euclid Ave., Cleveland, Ohio.
Sylvania Products Co., Emporium, Pa.
United Radio & Elec. Corp., 500 Chancellor Ave., Irvington, N. J.
Van Horne Tube Co., 280 Center, Franklin, Ohio.

RADIO TRANSFORMERS. See Radio Circuit Components.

RADIO TUBE BASE BRANDERS. See Engraving Radio Panel.

RADIO TUBE BASES. See Radio Molded Parts.

RADIO TUBE BULBS (Unfinished). See Bulbs, Glass.

RADIO TUBE PARTS

Filament Hooks, Mesh Plates, Special Bolts & Nuts, Stampings, etc.

Goat Radio Tube Parts, Inc., 33 35th, Brooklyn, N. Y. (Screens.)
Inno Fasteners, Inc., Hillside N J
Newark Plate Laboratories, 228 Jelliff Ave., Newark, N. J. (Mesh Plates.)
Newark Wire Cloth Co., 351 Verona Ave., Newark, N. J. (Screens).

CAMERON COMMUTATORS

Expertly made of finest materials

We are specialists in commutator construction and are equipped to fabricate and repair quickly any type of commutator from smallest to largest. CAMERON can safely say this because we carry in stock 100,000 pounds of hard drawn copper bar in 1,200 different sizes ready for immediate use.

CAMERON COMMUTATORS are accurately made of finest materials by men who have been "brought up on commutators" and trained to follow specifications minutely.

The Cameron Electrical Mfg. Co., Ansonia, Conn.

Fractional Horsepower MOTORS

Universal and induction type small fractional horsepower motors to meet all requirements for small motors. Send us your specifications.

SIGNAL ELECTRIC MFG. CO.
Menominee, Michigan
Small motor specialists since 1890

SIGNAL

★NATIONAL★

RHEOSTATS

FOR SMOOTH AND GRADUAL CONTROL OF—

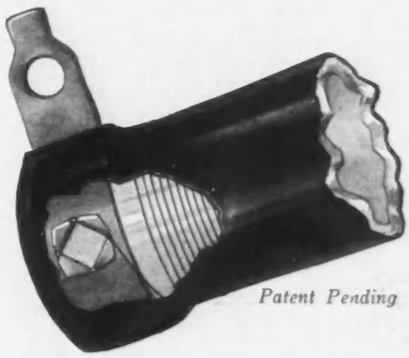
Adjustable Resistance At Its Best
SMALL IN SIZE
LIGHT IN WEIGHT
HIGH IN QUALITY
LOW IN PRICE
LONG IN LIFE

FINE CONTROL

MOTORS, GENERATORS
HEATERS, FILAMENTS
ARCS, TRANSFORMERS
MAGNETS
LABORATORY
APPARATUS
ETC., ETC.

Many Types and Sizes—Our 20th Year—Ask for Catalog

National Electric Controller Company
5315 Ravenswood Ave., Chicago, Ill., U. S. A.



Patent Pending

Two New Contacts for You..

ONE of them is shown above—the new Eyelet Contact that is now a standard part of every HH RESISTOR. It has been universally approved by Electrical and Radio Engineers for its effective reduction of *contact resistance* through increased, *fixed contact areas* between wire and terminal.

Our Catalog *is sent gladly on request. In addition to showing our products it brings simplified Resistance Computing Tables available nowhere else so far as we know. Write us for it—and ask too, for a description of the New HH Contact.*

The other new contact is the one that we welcome between your organization and ours. We are making RESISTORS for an impressive list of leaders in the industry. There are definite reasons why you should be among them. May we tell you what they are?

RESISTORS

Hardwick, Hindle, Inc.
216 Emmet St., Newark, N. J.

1. Air Heaters
2. Automatic Motor Starters.
3. D. C. Battery Charging Equipment.
4. Field Rheostats.
5. Laboratory Resistors and Rheostats.
6. Motor Starters and Controllers A. C. and D. C.
7. Radio Resistors and Rheostats.
8. Resistors for all purposes.
9. Rheostats for all purposes.
10. Speed Controllers.
11. Theatre Dimmers.

WARD LEONARD ELECTRIC CO.
31-41 South St. Mount Vernon, N. Y.

RADIO WIRING HARNESS

Special wiring cable and harness assemblies for radio battery connections, radio tube adapter harness for converting battery operated receivers to A.C. operation; Socket Adapters for Power Tubes; Loud Speaker Extension Cords—This heading also includes auto ignition assemblies.

Afco. See American Fabric Co.
Ajax Elec. Specialty Co., 1926 Chestnut, St. Louis, Mo.
Alden Mfg. Co., Brockton, Mass. (Adapters.)
Alpbus. See Alpha Wire Corp.
Alpha Wire Corp., 520 Broadway, New York, N. Y.
Alpstrand. See Alpha Wire Corp.
American Braiding Co., Holyoke, Mass.
Belden Mfg. Co., 4631 W. Van Buren, Chicago, Ill.
Birnbach Radio Co., 254 W. 31st St., New York, N. Y.
Blue Ribbon. See Crescent Braid, Inc.
Brach Mfg. Co., L. S., Newark, N. J.
Connectoralds. See Alden Mfg. Co.
Cornish Wire Co., 30 Church, New York, N. Y.
Corwico. See Cornish Wire Co.
Crescent Braid, Inc., Providence, R. I.
Crescent Insulated Wire & Cable Co., Trenton, N. J.
De Luxe, 50 W. Houston, New York, N. Y.
Diamond Braiding Mills, Chicago Heights, Ill.
Echo. See Cornish Wire Co.
Enterprise Mfg. Co., Third & Dauphin Sts., Philadelphia, Pa. (Adapters).
Frost, Inc., Herbert H., 1142 W. Beardsley, Elkhart, Ind. (Adapters.)
Hatfield Rubber Wks., Inc., Hillside & Long Aves., Hillside, N. J.
Lusterised. See American Braiding Co.
Manhattan Insulated Wire Co., 17 W. 60th St., New York.
Power, Inc., Harold J., Medford Hillside, Mass. (Adapters).
Radio Receptor Co., 106 Seventh Ave., New York, N. Y. (Adapters.)
Riga. See Birnbach Radio Co.
Sterling Mfg. Co., 2831 Prospect Ave., Cleveland, Ohio. (Adapters).
Tri-Power. See Sterling Mfg. Co.
Wilkens Mfg. Co., 52 Orawaupum St., White Plains, N. Y.

RADIUM POWDER AND PAINT

Radium Dial Co., 3332 Forbes, Pittsburgh, Pa.
Undark. See United States Radium Corp.
United States Radium Corp., 535 Pearl, New York, N. Y.
RANGE SWITCHES, Rotary Snap. See Switches, Snap, Heavy Duty.
RAWHIDE GEARS. See Gears & Pinions, Rawhide.
READING LAMP BASES. See Bases, Reading Lamp.
REAMERS, Pipe. See Stocks, Dies and Reamers.
RECEPTACLES, Lamp. See Sockets and Receptacles.

RECEPTACLES, Plug, Heavy Duty

	KEY
Battery Charging	See B
Floor Boxes	See F
Welding	See W
Machine Tool	See W
Watertight, Marine, Mine	See M
Car Trailer Connection	See C
Extension	See E

A. B. C. **See Anderson Mfg. Co.**
Adam Electric Co., Frank, St. Louis, Mo. F
Adapti Co., 2996 E. 72nd, Cleveland, O.. F
Anderson Mfg. Co., Albert & J. M., 289 A, Boston, Mass. B W M .. E
Appleton Elec. Co., 1703 Wellington Ave., Chicago, Ill. M
Arktite. See Crouse-Hinds Co.
Arnessen Electric Co., 13 Water, New York M
Arrow Electric Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.. F B W
Auth Electrical Specialty Co., 422 E. 53rd, New York, N. Y. E
Benjamin Elec. Mfg. Co., Des Plaines, Ill. F .. W M
Bryant Elec. Co., 1421 State, Bridgeport, Conn. (Also Range Type.) W
Campbell. See Steel City Elec. Co.
Cannon Elec. Development Co., 420 West Ave., 33, Los Angeles, Cal. F
C. E. M. Co. See Conn. Elec. Mfg. Co.
C. H. See Cutler-Hammer Mfg. Co.
Circle F Mfg. Co., Trenton, N. J. M
Conduletto. See Crouse-Hinds Co.
Connecticut Elec. Mfg. Co., Bridgeport, Conn. F
Cory & Son, Chas., 183 Varick, New York .. M
Crouse-Hinds Co., Syracuse N. Y. .. B W
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee, Wis. F
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa. C
Fielding. See Stanley & Patterson.
Fountain's. See Jenkins Mfg. Co.
Fullman Mfg. Co., Latrobe, Pa. F .. M
Fullman. See Steel City Elec. Co.
General Elec. Co., Merchandise Dept., Bridgeport, Conn. B
Gleason & Co., J. L., 241 Franklin, Boston, Mass. E
H. & H. See Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co.
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn. .. B W
Hessel Co., W. F., 76 Greenwich, New York, N. Y. W M .. E
Hubbell, Inc., Harvey, Bridgeport, Conn. (Also Range Type.) B W
Indestructible. See Kliegl Bros. Universal.
Jenkins Mfg. Co., Bloomfield, N. J. E
Kliegl Bros. Universal Elec. Stage Lighting Co., 321 W. 50th, New York, N. Y. F B W
Latrobe. See Fullman Mfg. Co.

Lexington Electric Products Co., 12 Chapel, Newark, N. J. C
Loeffelholz & Co., Milwaukee, Wis. C
Major Equipment Co., 4603 Fullerton ave., Chicago, Ill. M
Neco. See Novelty Elec. Co.
NePage McKenny Co., Seven Front, Seattle, Wash. F
Novelty Elec. Co., Tenth & Cherry Sts., Philadelphia, Pa. C
Ostrander Elecl. Works, W. R., 911 Atlantic Ave., Brooklyn, N. Y.
Perkins. See Bryant Elec. Co.
Preset. See Walker Bros. Co.
Pyle National Co., 1334 N. Kostner Ave., Chicago, Ill. W M C E
Quadrangle Mfg. Co., 32 S. Peoria, Chicago, Ill. (Combination wall bracket and convenience outlet.)
Raleo Mfg. Co., 123 N. Albany Ave., Chicago, Ill.
Russell & Stoll Co., 53 Rose, New York F B W M .. E
Square D. Co., Detroit, Mich. W
Stanley & Patterson, 150 Varick, New York, N. Y. F
Steel City Elec. Co., Pittsburgh, Pa.. F E
Thomas & Betts Co., 15 Park Place, New York, N. Y. F
V. V. Fittings Co., 711 Cherry, Philadelphia, Pa. M
Walker Bros., 12 E. 41st St., New York, N. Y. F E
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa. F B W M
Yale. See Electric Products Co.

RECORDERS, Elapsed Time. See Indicators, Operation.
REDUCERS, Socket. See Socket Reducers.
REFLECTOR LENSES. See Lenses.

REFLECTORS, Chromium Plated, Metal

Aga Auto Lamp Co., Amesbury, Mass.

REFLECTORS, Porcelain Enameled, Steel

ABolite Reflector Co., West Lafayette, Ohio.
Benjamin Elec. Mfg. Co., Des Plaines, Ill.
Duniap Co., John, Carnegie, Pa.
Durex. See Wheeler Reflector Co.
Federal Electric Co., 8700 S. State, Chicago, Ill.
Goodlites. See Goodrich Elec. Co.
Goodrich Elec. Co., 2935 N. Oakley Ave., Chicago, Ill.
Isolux. See Wheeler Reflector Co.
Jumbo. See Quadrangle Mfg. Co.
Marbelite Art Products Co., 1[illegible] N. Robey, Chicago, Ill.
Monk, H. E., 18 Warren, New [illegible]ork, N. Y.
Multi Elecl. Mfg. Co., 210 N. Ogden Ave., Chicago, Ill.
Oamaco. See Overbaugh & Ayers.
Overbaugh & Ayers Mfg. Co., 411 S. Clinton, Chicago, Ill.
Para Steel. See Wheeler Reflector Co.
Perfection. See Tindall & White.
Quad. See Quadrangle Mfg. Co.
Quadrangle Mfg. Co., 32 S. Peoria, Chicago, Ill.
Reliability. See ABolite Reflectors Co.
Richardson Reflector Co., 16 Hudson, New York, N. Y.
Sturdox. See Benjamin Elec. Mfg. Co.
Tindall & White, 33 W. 60th, New York, N. Y.
Vaporlux. See Wheeler Reflector Co.
Westinghouse Elec. & Mfg. Co., South Bend, Ind.
Wheeler Reflector Co., 275 Congress, Boston, Mass.

REFRACTORIES, Porcelain. See Cores Resistance Coil.
REFRIGERANTS. See Chemicals, Refrigeration.
REFRIGERATION CHEMICALS. See Chemicals, Refrigeration.

REFRIGERATOR CABINETS

Airtite. See Rhinelander Refrigerator Co.
Alaska Refrigerator Co., Muskegon, Mich.
Arlington Refrigerator Co., Arlington, Vt.
Athermos. See Gurney Refrigerator Co.
Baldwin Refrigerator Co., Burlington, Vt.
Banta Refrigerator Co., Clearfield, Pa.
Belding-Hall ElectrICE Corp., Belding, Mich.
Benjamin Elec. Mfg. Co., Des Plaines, Ill.
Bohn Refrigerator Co., St. Paul, Minn.
Cavalier. See Tennessee Furniture Co.
Champion Refrigerator Co., 206 Lexington Ave., New York
Crystal Refrigerator Co., Fremont, Neb.
Crysteel. See Benjamin Elec. Mfg. Co.
Dry-Air. See Baldwin Refrigerator Co.
Eddy & Sons Co., D., 336 Adams, Boston, Mass.
Erie Art Metal Co. & Erie Metal Furniture Co., Erie, Pa.
General Necessities Corp., General Necessities Bldg., Detroit, Mich.
Gibson Refrigerator Co., Greenville, Mich.
Gloekler Co., Bernard, 1627 Penn Ave., Pittsburgh, Pa.
Gurney Refrigerator Co., Fond du Lac, Wis.
Harder Refrigerator Corp., Cobleskill, N. Y.
Heintz Mfg. Co., Front & Olney Aves., Philadelphia, Pa
Heinz & Munschauer, Superior and Randall, Buffalo, N. Y
Herrick Refrigerator Co., 1803 River, Waterloo, Iowa.
Hibbard Cabinets, Inc., 6504 Euclid Ave., Cleveland, O
Holderle Bros., Inc., 339 Exchange, Rochester, N. Y.
Howe Scale Co., Rutland, Vt.
Jewett Refrigerator Co., Buffalo, N. Y
Kingston. See Lorillard Refrigerator Co.
Kleen Kold. See Harder Refrigerator Corp.
Knox. See Erie Art Metal Co.
Leonard Refrigerator Co., Div. of Kelvinator Corp., Grand Rapids, Mich.
Liver & Co., C. B., Omaha, Neb.
Loeber Co., Henry G., 151 E. 126th, New York, N. Y (Ice Cream Cabinet.)
Lorillard Refrigerator Co., 40 Cooper Square, New York.
Louisville Refrigerator Corp., 4460 Louisville Ave., Louisville, Ky.
Louisville Tin & Stove Co., Louisville, Ky.
Mace & Co., L. H., 55 E. 150th, New York, N. Y.
Maine Mfg. Co., Nashua, N. H.
McCray Refrigerator Sales Corp., 2664 Lake St., Kendallville, Ind.
Mowatt Refrigerator Co., 25 Oak Grove, San Francisco, Cal.
Omaha Fixture & Supply Co., 11th and Douglas, Omaha
Oreole. See Ottenheimer Bros.
Ottenheimer Bros., Baltimore, Md.
Reol. See Ottenheimer Bros.
Reolite. See Ottenheimer Bros.
Rhinelander Refrigerator Co., Rhinelander, Wis.
Sanitary Refrigerator Co., Fond du Lac, Wis.
Schmidt Co., C., John and Livingston, Cincinnati, O.
Seeger Refrigerator Co., St. Paul, Minn.
Steeprest. See Heintz Mfg. Co.
Success Mfg. Co., Gloucester, Mass.
Tennessee Furniture Co., Chattanooga, Tenn.
Vogt. See General Necessities Corp.
Ward Refrigerator Co., 6901 S. Alameda, Los Angeles, Cal.
White Mountain. See Maine Mfg. Co.
White Seal. See Louisville Refrigerator Co.

REFRIGERATOR CONDENSER UNITS. See Condenser Units, Refrigerator.

REFRIGERATOR FITTINGS

Commonwealth Brass Corp., Commonwealth Ave. & G. T. R. R., Detroit, Mich.

ELECTRIC CONTROL APPARATUS

Vitrohm Resistors
vitreous enamelled for protection and long life.

Ribohm Resistors
for greatest watts in smallest space.

WARD LEONARD ELECTRIC CO.
31-41 *South St., Mount Vernon, N. Y.*

REGULATORS, Temperature

American Radiator Co., 1807 Elmwood Ave., Buffalo, N. Y. (Mercury Switch Type.)
American Telethern Co., 1017 Summit, Toledo, O.
American Thermostat Co., 226 Jelliff Ave., Newark, N. J.
Automatic Electric Heater Co., 1706 Race, Philadelphia, Pa. (Furnace.)
Automatic Reclosing Circuit Breaker Co., Columbus, O.
Boston Machine Wks. Co., 7 Willow, Lynn, Mass.
Bristol Co., Plattes Bridge & Naugatuck Rd., Waterbury, Conn.
Brown. See Electric Automatic Appliance Co.
Brown Instrument Co., Wayne & Windrim, Philadelphia.
Ceaco. See Cobb Electric Appliance Co.
Cobb Electric Appliance Co., 100 Massachusetts Ave., Boston.
Cook Elec. Co., 2700 Southport Ave., Chicago, Ill.
Davis & Daggett Co., 238 Dwight, Springfield, Mass.
Duo-Stat. See Raymond Co.
D. & T. Manufacturing Co., 3001 La Salle, St. Louis, Mo.
Dunco. See Struthers Dunn, Inc.
Electric Automatic Appliance Co., Denver, Col.
Engelhart, Chas., 90 Chestnut, Newark, N. J.
Fabrice Thermostatic Control Co., 4750 Sheridan Rd., Chicago, Ill.
Gifford Heat Control Systems, 1 Broadway, New York.
Gold Car Htg. & Ltg. Co., 220 36th, Brooklyn, N. Y.
Hart Mfg. Co., Hartford, Conn.
Hermansen Elecl. Co., 505 W. 41st, New York, N. Y.
Hynes & Cox Elec. Corp., 406 N. Pearl, Albany, N. Y.
Jewell Mfg. Co., Auburn, N. Y.
Johnson Service Co., 149 Michigan, Milwaukee, Wis.
Lockswitch. See Time-O-Stat Controls Co.
Majestic Electric Appliance Co., San Francisco, Cal.
Marrel. See American Thermostat Co.
Mercoid Corp., 564 W. Adams, Chicago, Ill. (Mercury Switch.)
Minneapolis-Honeywell Regulator Co., 2753 Fourth Ave., Minneapolis, Minn.
Penn Electric Switch Co., E. 20th & Walnut Sts., Des Moines, Iowa.
Powers Regulator Co., 2720 Greenview Ave., Chicago, Ill.
Protectostat. See Minneapolis-Honeywell.
Quick Freeze. See Penn Electric Switch Co.
Ranco. See Automatic Reclosing Circuit Breaker Co.
Raymond Co., F. I., 228 N. La Salle, Chicago, Ill.
Savutime Devices, Inc., 88 Manhattan, Rochester, N. Y.
Simplex Heat Regulator, 2938 Pillsbury Ave., Minneapolis.
Snapon. See Tagliabue Mfg. Co.
Struthers Dunn, Inc., 138 N. Juniper, Philadelphia, Pa.
Sure Fire. See Boston Machine Wks.
Tagliabue Mfg. Co., C. J., 18 33rd, Brooklyn, N. Y.
Time-O-Stat Controls Co., Elkhart, Ind.
Trent Co., Harold E., 439 N. 12th, Philadelphia, Pa.
Webster Elec. Co., Racine, Wis.
White Mfg. Co., 2362 University Ave., St. Paul, Minn.
Wilcolator Co., Newark, N. J.
Wilson-Maeulin Co., 383 Concord Ave., New York, N. Y

REGULATORS, Voltage

American Instrument Co., 774 Girard, N. W., Washington, D. C.
Anderson & Co., C. J., 212 W. Austin Ave., Chicago, Ill.
Marshall Electric Co., Elkhart, Ind.
Rotor. See Ward-Leonard Electric Co.
States Co., 19 New Park Ave., Hartford, Conn.
Ward-Leonard Electric Co., 31 South, Mount Vernon, N. Y. (See also Circuit Breakers and Thermostats.)

RELAYS

American Brown Boveri Elec. Corp., Camden, N. J.
Automatic Switch Co., 154 Grand, New York, N. Y.
Benjamin Elec. Mfg. Co., Des Plaines, Ill.
Burke Controller Co., 369 Lexington Ave., New York, N. Y
Electric B-G Products Co., Ithaca, Mich.
Dunco. See Struthers Dunn, Inc.
General Electric Co., Schenectady, N. Y.
G-M Laboratories, Inc., Grace & Ravenswood Ave., Chicago.
Leach Relay Co., 860 S. Los Angeles, Los Angeles, Cal.
McWilliams. See Electric B-G Products Co.
Roller-Smith Co., 239 Broadway, New York, N. Y.
Signal Engineering & Mfg. Co., 146 W. 14th, New York
Struthers Dunn, Inc., 138 N. Juniper, Philadelphia, Pa.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Wilcolator Co., Newark, N. J.

REMOTE CONTROL SWITCHES. See Switches, Remote Control.

REMOVERS, Coil

Ewing Mfg. Company, Middleport, Ohio

RESINOID PLASTICS. See Molded Insulation.

RESISTANCE
Boxes. See Instruments, Laboratory Standard
Coil Cores. See Cores, Resistance.
Test Sets. See Instruments
Units, Radio. See Radio Circuit Components
Units. See Units, Rods & Grids.
Wire. See Wire Bare.

RESISTORS

Hardwick, Hindle, Inc., 215 Emmett, Newark, N. J.
Ohmite Mfg. Co., 633 N. Albany Ave., Chicago, Ill.
Ward Leonard Electric Co., 31 South, Mount Vernon, N. Y.

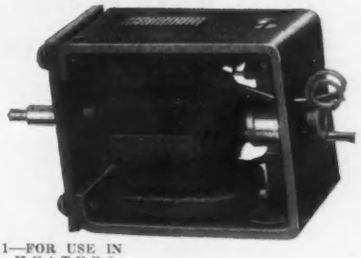
RESISTORS. See Units, Rods & Grids.
RESURFACERS, Commutator. See Stones, Commutator, also Tools, Commutator Truing.
REVOLUTION COUNTERS. See Tachometers.

RHEOSTATS.
Motor-Controlling. See Controllers, also Rheostats
Radio. See Radio Receiver Parts.
Sewing Machine. See Controllers.

RHEOSTATS

	KEY
Battery Charging	See B
Stage Dimming	See D
Meter Testing (Laboratory)	See L
Plating Tank	See P
Motion Pictures (Projector Lamp)	See M
Motor Starting, Field and Speed Regulating	See F

small motor[1] : large motor[2]
=efficiency[1] : efficiency[2]



NO 121—FOR USE IN AUTO HEATERS, SMALL DRILLS, MOTION PICTURE PROJECTORS, ETC.

KENDRICK and Davis manufacture fractional horse power motors that are constructed with the same exacting standards as are applied to the building of large motors and generators and deliver the same degree of efficiency in ratio to their size.

We have had thirty years' experience in building K & D small motors and welcome the opportunity to cooperate with electrical equipment manufacturers in their problems.

KENDRICK & DAVIS CO.
Lebanon, N. H.

Commutators-

and other parts

Leading manufacturers of electrical equipment are depending on "EUREKA" as their regular source of supply for Commutators, Commutator Bars (forged, drawn or cast), Brush Holders, Copper Leaf and Gauze Brushes. Collector Rings and Soles. Controller Fingers, Segments, Field Plates, etc. Switches. Non-ferrous Castings and Drop Forgings.

Highest quality parts at reasonable prices, and prompt deliveries.

Will be glad to figure with you on all or part of your requirements—write us.

EUREKA METAL PRODUCTS CORPORATION
2210 ELMWOOD AVENUE, BUFFALO, N. Y.

EUREKA

HANDY & HARMAN
HANDY SOLDERS
QUALITY SERVICE

"Handy"
SILVER SOLDERS

Conductivity

Silver is even a better conductor of electricity than copper—in fact, it is the best of all metals. Therefore, it has been possible to develop silver solders which have very low resistance. The silver content of standard "Handy" Silver Solders ranges from 10% to 80%. Each composition is checked by assaying. Weights are taken on precious metal scales in troy ounces and decimal parts. This insures absolute uniformity.

Melting Temperatures

"Handy" Silver Solders require only from 1325° to 1600° F., depending upon the composition. This makes it possible to join small, thin parts without damage.

Strength

Joints made with "Handy" Silver Solders have tensile strength of 40,000 to 60,000 lbs. per sq. in., often stronger than the parts joined and they are ductile, resisting shock and vibration.

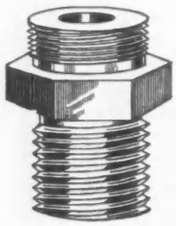
Corrosion Resistance

Silver's resistance to corrosion gives "Handy" silver soldered or brazed joints a long life of usefulness.

Send for Bulletin No. 3E and other literature useful to workers in metals.

HANDY & HARMAN
Executive Offices
57 William Street, New York City

Principal Plant
Bridgeport, Conn.
Service Plants: Fulton and Gold Sts., New York City.
Providence, R. I.



BOTH
automatic and hand
Screw Machine Products
also
ASSEMBLING
SOLDERING
HARDENING
PLATING

PARENT MACHINE & SCREW CO.
50-56 Canal St., Salem, Mass.

F B D P M L

RHEOSTATS—Continued
Allen-Bradley Co., 493 Clinton, Milwaukee L
Biddle, James G., 1209 Arch, Philadelphia L
Brach Mfg. Corp., L. S., Newark, N. J.
(Radio Battery Control.) . . . . . B . . . . .
Bradleystat. See Allen-Bradley Co.
Columbia Electric Mfg. Co., 1292 E. 53rd, Cleveland, O. . . . . P . . .
Controlite. See Ward Leonard Elec. Co.
Crown Rheostat & Supply Co., 1908 Maypole Ave., West Chicago, Ill. . . . . P . . .
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee, Wis. . . . . F B D . . . L
Economic Rheostat Switch Co., 3551 N. 5th, Philadelphia, Pa. . . . . F . . . . . .
Electric Controller & Mfg. Co., 2700 E. 79th, Cleveland, O. . . . . F . . . . . .
Electric Products Co., 1725 Clarkstone Rd., Cleveland, O. . . . . B . . . . . .
General Electric Co., Schenectady, N. Y. F L
Hanson-Van Winkle-Munning Co., Matawan, N. J. . . . . P . . . .
Holzmuller, C. J., 1108 Howard, San Francisco, Cal. . . . . D . . . . .
Kliegl Bros. Universal Elec. Stage Lighting Co., 321 W. 50th, New York, N. Y. . . . D . . M . .
Knoeller Elec. Co., De Pere, Wis. . . . . F . . . . . .
National Elec. Controller Co., 5315 Ravenswood Ave., Chicago. . . . . F B D . . M L
Optimus. See Hanson-Van Winkle-Munning Co.
New York, N. Y. . . . . M . .
Rubicon Co., 29 W. Sixth, Philadelphia. L
Schaefer Bros. Co., 1059 W. 11th, Chicago . . B . . . . . .
Simplicity. See Cutler-Hammer Mfg. Co.
Robertson, Leo F., Inc., 523 W. 22nd,
Universal. See Ward Leonard Elec. Co.
Vitrohm. See Ward Leonard Elec. Co.
Ward Leonard Elec. Co., 31 South, Mt. Vernon, N. Y. . . . . F . . D . . M . .
Wotton. See Electric Products Co.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa. . . . . F . . . . . M . .

RINGS Seal. See Packing.

RIVETS

Aluminum Co. of America, 2444 Oliver Bldg., Pittsburgh.
American Brass Co., Waterbury, Conn.
Blake & Johnson Co., 1497 Thomaston Ave. (Waterville), Waterbury, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Chicago Rivet & Specialty Co., 1830 S. 54th, Chicago, Ill
Hassall, Inc., John, 402 Oakland, Brooklyn, N. Y.
Hungerford Brass & Copper Co., Div. of The Chase Brass Companies, Inc., 88 Lafayette, New York, N. Y.
Manufacturers Belt Hook Co., 1315 W. Congress, Chicago, Ill.
Nelson Rivet Co., Taunton, Mass.
Stimpson Co., Edwin B., 70 Franklin Ave., Brooklyn, N. Y.
Thomson Mfg. Co., Judson L., Waltham, Mass.
Tubular Rivet & Stud Co., 87 Lincoln, Boston, Mass.
Waterbury Brass Goods Co., Waterbury, Conn.
Wright & Corson Mfg. Co., Bridgeport, Conn.

RODS, Resistance. See Units, Rods and Grids.
ROLLER BEARINGS. See Bearings, Ball and Roller.

ROLLS, Coil Flattening

Columbia Machine Tool Works & Malleable Iron Co., Atlantic Ave. and Chestnut St., Brooklyn, N. Y.

RUBBER BELTS. See Belts, Rubber.

RUBBER, Hard

Hard Rubber, Ebonite, Vulcanite.
Aetna Rubber Co., Ashtabula, O.
American Hard Rubber Co., 11 Mercer, New York, N. Y.
Connecticut Hard Rubber Co., West Haven, Conn.
Goodrich Rubber Co., B. F., Akron, O.
Insuline Corp. of America, 78 Cortlandt, New York, N. Y.
Luzerne Rubber Co., Muirhead, near Dewey, Trenton, N. J.
Mahoganite. See American Hard Rubber Co.
New York Hard Rubber Turning Co., 212 Centre, New York.
Panelyte Corp., Lincoln Bldg., New York, N. Y.
Radiolite. See Superior Hard Rubber Co.
Stokes Rubber Co., Jos., Trenton, N. J.
Superior Hard Rubber Co., Butler, N. J.
United States Rubber Co., 1790 Broadway, New York, N. Y.
Vulcanized Rubber Co., 251 4th Ave., New York, N. Y.
Vulco Panels. See Vulcanized Rubber Co.

RUBBER, MECHANICAL GOODS

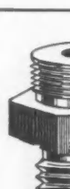
Goodrich Rubber Co., B. F., Akron, O.
Manhattan Rubber Mfg. Co., Passaic, N. J.
Republic Rubber Co., Youngstown, O.
Rodale Mfg. Co., 200 Hudson, New York, N. Y.
Sun Rubber Co., Barberton, O.
Toycraft Rubber Co., Dept. W., Ashland, O.

RUBBER, SEMI-HARD. See Rubber Mechanical Goods.

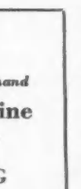
RUBBER, Sponge

Sun Rubber Co., Barberton, O.
Toycraft Rubber Co., Dept. W., Ashland, O.

RUBBER TAPE. See Tape, Rubber and Friction.
RUBBER TUBING. See Tubing, Rubber.
RUST PROOFING. See Plating & Finishing.
SAL AMMONIAC. See Chemicals, Battery.



SCREW MACHINE PRODUCTS AND SPRINGS
for every purpose
WILLIAM STEINEN & COMPANY
297 Washington St. Newark, N. J.



SALTS, Battery. See Chemicals, Battery.
SATURATING TANKS. See Wire Manufacturing Machines
SCREW SHELLS, Socket. See Shells, Screw Socket.

SCREW DRIVING MACHINES

Vim Electric Tool Co., 149 Broadway, New York, N. Y.

SCREW MACHINE PRODUCTS

Aluminum Co. of America, 2444 Oliver Bldg., Pittsburgh, Pa
American Metal Wks., 4565 Stanton Ave., Philadelphia Pa
Arrow Automatic Products Corp., 27 Vestry, New York,
Barnes Co., Wallace, Bristol, Conn.
Belco. See Bell Co., David.
Bell Co., David, 1555 Fillmore Ave., Buffalo, N. Y. (Special Parts.)
Blake & Johnson Co., 1497 Thomaston Ave., Waterville.
Blake & Johnson Co., 1497 Thomaston Ave. (Waterville), Waterbury, Conn.
Bridgeport Brass Co., 774 E. Main, Bridgeport, Conn.
Brighton Screw & Mfg. Co., 1456 Harrison Ave., Cincinnati, O.
Chapman Machine Co., Terryville, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Colonial-Premier Co., 229 W. Ohio, Chicago, Ill.
Continental-Diamond Fibre Co., Bridgeport, Pa
Corbin Screw Corp., 226 High, New Britain, Conn.
Eureka Tool & Machine Co., Newark, N. J.
Faries Mfg. Co., Decatur, Ill.
Great Western Mfg. Co., La Porte, Ind.
Hanson, Elnar B., 17 Hermon, Worcester, Mass.
Hartford Machine Screw Co., 476 Capitol Ave., Hartford, Conn.
Hubbell, Inc., Harvey, Bridgeport, Conn.
Humason Mfg. Co., Forestville, Conn.
Interstate Products Corp., 503 Mulberry, Newark, N. J.
Linden & Co., 891 Broad, Providence, R. I.
Mattatuck Mfg. Co., Waterbury, Conn.
Meisel Press Mfg. Co., 944 Dorchester Ave., Boston, Mass.
Olsen Mfg. Co., 56 Commercial, Worcester, Mass.
Parent Machine & Screw Co., 50 Canal, Salem, Mass.
Peck Spring Co., Plainville, Conn.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Plume & Atwood Mfg. Co., 474 Bank, Waterbury, Conn.
Progressive Mfg. Co., Torrington, Conn.
Scovill Mfg. Co., Waterbury, Conn.
Screw Machine Products Corp., Providence, R. I.
Shimer & Sons, Samuel J., Milton, Pa.
Steiner & Co., 297 Washington, Newark, N. J.
Thomaston Mfg. Corp., Thomaston, Conn.
Watkins Co., D. M., 270 Pine, Providence, R. I.
Waterbury Brass Goods Corp., Waterbury, Conn.
Wilmington Fibre Specialty Co., Wilmington Del.
Wright Machine Co., 79 Armory, Worcester, Mass.

SCREWS, Cap (Cut Thread)

Bristol Co., Waterbury, Conn.
Hartford Machine Screw Co., Hartford, Conn.

SCREWS, Drive

Parker-Kalon Corp., Dept. K., 190 Varick, New York, N. Y.

SCREWS, Machine

Blake & Johnson Co., 1497 Thomaston Ave. (Waterville), Waterbury, Conn.
Chicago Nut Mfg. Co., 2513 Cullerton, Chicago, Ill.
Clark Metal Products, Inc., 490 Hancock Ave., Bridgeport, Conn.
Elco Tool & Screw Corp., 1818 Broadway, Rockford, Ill.
Hassall, Inc., John, 402 Oakland, Brooklyn, N. Y.
Hubbell, Inc., Harvey, Bridgeport, Conn.
New England Screw Co., Dept. A, 44 Farnsworth, Boston,
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Progressive Mfg. Co., Torrington, Conn.
Scovill Mfg. Co., Waterbury, Conn.
Screw Machine Products Corp., Providence, R. I.
Strong, Carlisle & Hammond, 1392 W. Third, Cleveland, O

SCREWS, Machine (Cut Thread)

American Screw Co., Providence, R. I.

SECOHMMETERS. See Instruments, Laboratory Standard.
SEGMENTS. See Discs, Armature.

SEPARATORS, Storage Battery

Campbell Elec. Co., Kansas City, Mo.
Carlile & Doughty, 2530 N. Broad, Philadelphia, Pa.
Chattanooga Battery Box Co., Chattanooga, Tenn.
Certified. See Ermet Products Co.
Ermet Products Co., Sherman Drive & 16th, Indianapolis, Ind. (Wood.)
Estes & Sons, E. B., 25 Vanderbilt Ave., New York. (Wood.)
Indianapolis Box & Separator Co., 2101 Yandes, Indianapolis, Ind. (Wood.)
Indianapolis Mfg. Co., Indianapolis, Ind.
Inseco. See Indianapolis Box & Separator Co.
Link & Hemrick, Inc., 555 W. 52nd, New York, N. Y.
Red Band. See Indianapolis Mfg. Co.
Stewart Mfg. Co., Wm. E., 14th & Elm, Flint, Mich. (Wood.)
Wick Lumber Co., R., 539 W. 52nd, New York. (Wood.)

SHADES

Aluminum. See Shades, Metallic.
Asbestos. See Shades, Fabric.
Bamboo. See Shades, Fabric.
Brass. See Shades, Metallic.
Cast Metal. See Shades and Domes.
Copper. See Shades Metallic.
Cretonne. See Shades, Fabric.
Leaded. See Shades and Domes.
Leather. See Shades, Fabric.
Linen. See Shades, Fabric.
Mica. See Shades, Mica.
Molded. See Molded Insulation.
Mosaic. See Shades and Domes.
Parchment. See Shades, Fabric.
Paper. See Shades, Fabric.
Silk. See Shades, Fabric.
Stamped Metal. See Shades, Metallic; also Shades and Domes.
Steel. See Shades, Metallic.
Tin. See Shades, Metallic.
Zinc. See Shades, Metallic.

SHADES, Fabric

Asbestos Cretonne, Leather, Linen, Paper, Silk, Bamboo Parchment.
Acme Lamp Shade Co., 630 West Jackson Blvd., Chicago. (Silk.)
Adelphi Lamp Shade Co., 242 Fifth Ave., New York. (Silk.)
Admiration Lamp Shade Co., 160 Madison Ave., New York, N. Y. (Silk.)
Andrews Co., C. M., 32 E. 30th, New York, N. Y. (Silk.)
Art Lamp Shade Studios, 316 Fifth Ave., New York, N. Y.
Audrey Art Shade Studios, 105 Thatford Ave., Brooklyn.
Block & Co., L. D., 37 E. 18th St., New York, N. Y.
Borghese. See Hall, Chas.
Clark, H. W., 813 Fourth Ave. N., Troy, N. Y. (Parchment.)
Daiger Co., Charles V., 76 Essex, Boston, Mass. (Silk.)
Eastern Art Shop, 14 W. 19th, New York. (Parchment.)

Screw Machine Products
UP TO 2¼ in. DIAMETER

OLSON MFG CO.
56 Commercial St.
WORCESTER, MASS.

Foss Parchment Shade Studio, 1338 E. 12th, Oakland, Cal. (Parchment.)
Fosslite. See Foss Parchment Shade Studio.
Frustelena. See Art Lamp Shade Studios.
Gibson Art Co., 223 W. Fourth, Cincinnati, Ohio. (Paper.)
Hall, Chas., 5 E. 40th, New York, N. Y. (Paper Parchment.)
Hanson Co., Paul, 15 E. 26th, New York, N. Y. (Chintz.)
Harris Mfg. Co., 122 University Place, New York, N. Y. (Parchment.)
Herco Art Mfg. Co., Meriden, Conn.
Hoft Studio, 46 W. 21st, New York, N. Y. (Parchment.)
Idealite Lamp Shade Mfg. Co., 49 55 Fremont, Jersey City, N. J. (Parchment.)
Kapa Shell. See Wardwell, E. H.
Kerwin. See Hall, Chas.
Kno-Glair. See Hamilton, M. E.
Lamb Bros. & Greene Corp., Napannee, Ind. (Silk.)
Luxrite. See John H. St. John.
Maxwell-Ray Co., Milwaukee, Wis. (Silk.)
Monarch Lamp & Shade Co., 210 N. Second, Philadelphia, Pa. (Silk.)
Morimura Bros., 58 W. 23rd, New York. (Bamboo, Silk, Cretonne.)
Parchment Novelty Co., 87 E. 10th, New York, N. Y. (Parchment.)
Patent Lamp Shade Co., 1361 Frankford Ave., Philadelphia.
Peerless Lamp Shade Mfg. Co., 114 E. 25th, N. Y. (Silk.)
R. D. Electric Co., 2425 Spy Run, Fort Wayne, Ind. (Linen and Silk.)
Reuter, Wm., 32 W. 34th, New York, N. Y. (Silk.)
Rindsberger Mfg. Corp., 18 E. 24th, Chicago, Ill.
Rosita Studio, 10 W. 28th, New York, N. Y. (Parchment and Leatherette.)
Sanderson's Art Co., Milwaukee, Wis. (Parchment.)
Springel & Son, A., 26 S. 3rd, Philadelphia, Pa.
St. John, John H., 1298 Atlantic Ave., Brooklyn, N. Y. (Silk.)
Superior Lamp Shade Manufacturers, 72 Madison Ave., New York, N. Y. (Silk.)
Tombs Studios, Wm. H., 172 Pennsylvania Ave., Newark, N. J. (Parchment Paper.)
Trio Mfg. Co., 610 N. American, Philadelphia, Pa. (Silk.)
Utility Shade Co., Tenafly, N. J.
Vogue Lamp & Shade Co., 130 W. 17th, New York, N. Y. (Parchment.)
Volkman & Co., 2123 W. Lake, Chicago, Ill.
Wardwell, E. H., 11 E. 36th, New York, N. Y.

SHADES AND DOMES

Leaded, Mosaic or Figured, Stamped or Cast Metal.
Art Shade Co., 224 N. Desplaines, Chicago, Ill.
Badanes Mfg. Co., 62 Greene, New York, N. Y.
Bayley & Sons, 105 Vanderveer, Brooklyn, N. Y.
Mutual Sunset Lamp Co., 21 E. Houston, New York, N. Y.
Western Art Glass Shade Works, 101 Turk, San Francisco.

SHADES, FACTORY WINDOW. See Window Shades, Factory.

SHADES, Metallic

Tin, Aluminum, Brass, Copper, Zinc, Steel.
A. A. Elec. Mfg. Co., Bridgeport, Conn. (Sole selling agent, Harry Pickhardt, 129 W. 15th, New York, N. Y.)
Durex. See Wheeler Reflector Co.
Faries Mfg. Co., Decatur, Ill. (Brass, Aluminum, Tin, Copper.)
Frink Co., Inc., 369 Lexington Ave., New York, N. Y. (Aluminum, Brass, Zinc, Iron, Steel.)
Hubbell, Inc., Harvey, Bridgeport, Conn. (Aluminum, Brass, Steel, Tin.)
Miller Co., Meriden, Conn.
Monk, H. E., 18 Warren, New York, N. Y. (Tin, Aluminum, Brass, Copper, Zinc & Steel).
Oamco. See Overbaugh & Ayres Mfg. Co.
Overbaugh & Ayres Mfg. Co., 411 S. Clinton, Chicago, Ill.
Richardson Reflector Co., 16 Hudson, New York, N. Y.
Western Reflector Co., 1221 W. Madison, Chicago. (Tin.)
Wheeler Reflector Co., 275 Congress, Boston, Mass.

SHADES, Mica

Hirsch Mica Co., 1087 Flushing Ave., Brooklyn, N. Y.
Huse-Liberty Mica Co., 73 Long Wharf, Boston, Mass.
Kant-Krack. See Huse Liberty Mica Co.
Mica Insulator Co., 200 Varick, New York, N. Y.
Storrs Mica Co., 11 Park Place, New York, N. Y.
Tar Heel Mica Co., Plumtree, N. C.
Tarmilite. See Tar Heel Mica Co.

SHAFT COUPLINGS. See Couplings, Shaft.
SHAFTS, Flexible. See Tubing, Flexible Metallic.
SHEARS, Metal Cutting. See Shears, Power.
SHEARS, Rotary. See Shears, Power.

SHEARS, Insulation

Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.

SHEARS, Power

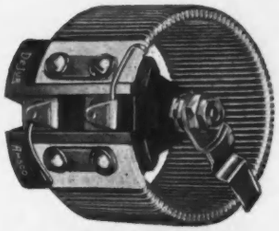
Niagara Machine & Tool Wks., 637 Northland, Buffalo N. Y.

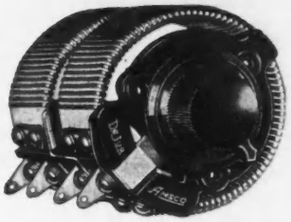
SHEET STEEL CABINETS. See Cabinets, Sheet Steel.

SHELLS, Screw Socket

Chase Brass & Copper Co., Waterbury, Conn.
Dallas Brass & Copper Co., Div. of Revere Copper & Brass Inc., 820 Orleans, Chicago, Ill.

SCREW MACHINE PRODUCTS
In Brass or Steel
Send us your specifications for an estimate.
LINDEN & COMPANY
891 Broad St.,
Providence, R. I.





POWER–DELICATELY CONTROLLED

DeJur-Amsco

Power Rheostats and Potentiometers

DeJur-Amsco power rheostats and potentiometers are engineered mechanically and electrically to provide a consistent and unvarying current control and to give an added degree of perfection in the power control of circuits and systems to which the wire wound variable resistor is adapted.

Engineers will immediately recognize in these Dejur-Amsco variable resistors the solution of many problems in Power Circuits, Mixing Panels, Spot Welding, Motors and in the Photo-Electric field.

Write us your requirements. Our engineers are ready to assist you in the development of special apparatus to fit your particular needs. Literature on request.

STANDARD RHEOSTATS

For lower power requirements our standard line of rheostats provides the same satisfactory electrical and mechanical assurance characteristic of our heavy duty design. Supplied as rheostats or potentiometers for panel mounting.

DEJUR-AMSCO CORP.
Fairbanks Building,
Broome & Lafayette Sts., New York City

all-Steel Mailing Table

No. 3040. Sheet steel. 16-compartment sorting top, removable shelves or trays. Locking door hinged on top, if desired. Table top stands 30" high from floor, 33" deep and 41½" wide, 16-gauge sheet steel. Legs, 1½" angle steel. Finish, olive green enamel.

EFFICIENCY is simply productive manpower. Give your employes the proper tools, equipment for conserving time, effort and thought. Mailing tables are only one of hundreds of efficiency aids made by us for plant and office use. They are light-weight, absolutely rigid, space-saving and a life-time investment. Ask for Representative — or catalog "C-EM."

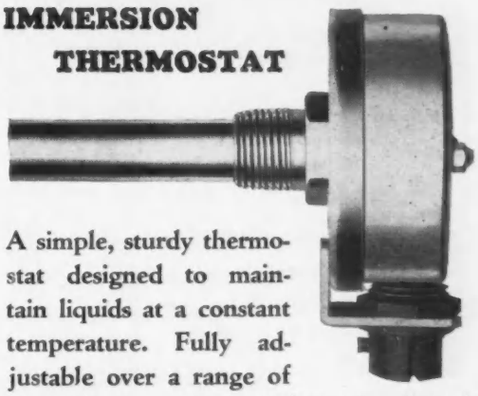
Special Angle and Sheet Steel Equipment also Built to Your Specific Needs.

ANGLE STEEL STOOL COMPANY
Agents in All Principal Cities
PLAINWELL, MICHIGAN

WILCOLATOR

"TYPE W"

IMMERSION THERMOSTAT



A simple, sturdy thermostat designed to maintain liquids at a constant temperature. Fully adjustable over a range of 30-550° F. sensitivity ±5° F. Excellent for hot water heaters.

Write for Publication No. 100

THE WILCOLATOR CO.
Newark New Jersey

PORTLAND-MONSON SLATE CO.

Quarriers of

Monson Slate

for Electrical

Purposes, Natural Black, Oil Finish

Quarries:

Monson, Maine

Office, Portland, Maine

SHELLS, Screw Socket—Continued
Monowatt Electric Corp., 24 W. 40th, New York, N. Y.
Patton-MacGuyer Co., Providence, R. I.
Risdon Mfg. Co., Naugatuck, Conn.
Scovill Mfg. Co., Waterbury, Conn.
Torrington Mfg. Co., 70 Franklin, Torrington, Conn.
Waterbury Brass Goods Corp., Waterbury, Conn.
SHUNTS, Instruments. See Instruments, Laboratory Standard.
SIGN FLASHERS. See Flashers, Sign.
SIGN LETTER LENSES. See Lenses.

SILICA

Ottawa Silica Co., Ottawa, Ill. "Flint Shot."
SILK, Cloth Insulated. See Cloth & Paper.
Shades. See Shades, Fabric.
Tape. See Tape.
Thread. See Yarn, etc.

SILVER, Metal and Wire

Baker & Co., Inc., 54 Austin, Newark, N. J.
Eisler Electric Corp., 770 S. 13th St., Newark, N. J
General Plate Co., Attleboro, Mass.
Gilby Wire Co., Riverside Ave., Newark, N. J.
Handy & Harman, 57 William, New York, N. Y.
National-Harris Wire Co., Newark, N. J.
Wilco. See Wilson Co., H. A.
Wilson Co., H. A., Newark, N. J.
SILVER SOLDER. See Solder, Silver.
SINE WAVE OSCILLATORS. See Instruments, Laboratory Standard.
SIGN ELECTRODES, Gas. See Electrodes for Gas Signs.
SKINNERS WIRE. See Scrapers.
SLABS, Switchboard. See Asbestos Slabs; also Molded Insulation, Slate; Soapstone.

SLATE

For Switchboard Slabs and Barriers.
Davis Slate & Mfg. Co., 618 E. 40th, Chicago, Ill.
Electrical Specialties Corp., 50 Pearl, Boston, Mass.
Fair Haven Marble & Marbleized Slate Co., Fair Haven, Vt
Penrhyn Slate Co., Hydeville, Vt.
Portland-Monson Slate Co., Portland, Me.
Structural Slate Co., Pen Argyl, Pa.
SLEEVE-BEARINGS. See Bearings and Bushings
SLEEVING, Cotton. See Tape, Cotton.
SLOTTING FILES. See Files, Commutator Slotting.

SLOTTING MACHINES and TOOLS, Commutator

(Mica Undercutters).
Allen Electric & Equipment Co., Kalamazoo, Michigan.
Binghamton Flexible Shaft Co., Binghamton, N. Y.
Burton & Rogers Co., 857 Boylston, Boston, Mass.
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
General Electric Co., Schenectady, N. Y.
Hobart Bros. Co., Troy, Ohio.
Hullhorst Micro Tool Co., 3242G Monroe, Toledo, O.
Ideal Commutator Dresser Co., 1039 Park Ave., Sycamore, Ill.
Imperial. See Martindale Elec. Co.
Martindale Electric Co., 1262 W. Fourth, Cleveland, Ohio.
Onan, David W., 43 Royalstone Ave., Minneapolis, Minn.
Peerless. See Electric Service Supplies Co.
Ransom & Randolph Co., Superior & Chestnut, Toledo, Ohio.
Simplex. See Weidenhoff, Joseph.
South Bend Lathe Works, 425 E. Madison, South Bend, Ind.
Weidenhoff, Joseph, 4852 Roosevelt Rd., Chicago, Ill
White Dental Mfg. Co. (Industrial Div.), S. S., 152 W. 42nd, New York, N. Y.
SNAP SWITCHES. See Switches, Snap

SOAPSTONE

For Switchboard Slabs and Barriers.
Alberene Stone Co., 153 W. 23rd, New York, N. Y.
Kirchberger & Co., Inc., 1425 37th, Brooklyn, N. J.
Lin-Stun. See Westinghouse.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa
SOCKET LININGS. See Linings, Socket
SOCKET SHELLS. See Shells, Screw Socket.
SOCKETS, Flashing. See Flashers, Sign.

SOCKET Chain Attachments

Chain Links, Chain Adjusters, Acorns, Extensions, Insulated Chain Splicers.
Abbott. See Harvey Hubbell, Inc.
Arrow Electric Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.
Benjamin Elec. Mfg. Co., Des Plaines, Ill.
Bryant Electric Co., Bridgeport, Conn.
Duplex. See Warner Bros. Co.
Eade, John E., 104 Point, Providence, R. I. Links, Insulators.
Easylite. See Rittenhouse Co., A. E.
Economy. See Harvey Hubbell, Inc.
Flory, Wm. E., 38 W. 32nd, New York, N. Y. (Decorative Pull Chains.)
Gripper. See Wittenberg Bros.
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn. (Metal Pull Tassel.)
Hubbell, Inc., Harvey, Bridgeport, Conn. (Links and Acorns. Metal Pull Tassels.)
Paiste. See Hart & Hegeman Mfg. Co.
Pass & Seymour, Inc., Solvay Sta., Syracuse, N. Y. (Pull Chain Tassel.)
P. & S. See Pass & Seymour, Inc.
Rittenhouse Co., A. E., Honeoye Falls, N. Y. (Sole Selling Agent, Hatheway & Co., 16 Hudson, New York, N. Y.)

Rodale Mfg. Co., 200 Hudson, New York, N. Y.
Royal. See Sears, Henry D.
Scovil Mfg. Co., Waterbury, Conn. (Acorn.)
Sears, Henry D., 50 Boylston, Boston, Mass.
Waterbury Brass Goods Co., Waterbury, Conn. (Acorns.)
Weber. See Sears, Henry D.
Wittenberg Bros., 60 Shipman, Newark, N. J. Links, Insu-

SOCKET REDUCERS

Arrow Elec. Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.
Benjamin Elec. Mfg. Co., Des Plaines, Ill.
Cpn-del-lite. See Sears, Henry D.
Eagle Electric Mfg. Co., 79 Hall, New York, N. Y.
Electric Co., 94 Allyn, Hartford, Conn.
General Electric Co., Merchandise Dept., Bridgeport, Conn.
Hart & Hegaman Div. of Arrow-Hart & Hegeman Elec. Co. Hartford, Conn.
Morse Co., Frank W., 291 Congress, Boston, Mass.
Pass & Seymour, Solvay Sta., Syracuse, N. Y.
Propp Co., M., 524 Broadway, New York, N. Y.
Rodale Mfg. Co., 200 Hudson, New York, N. Y.
Sears, Henry D., 50 Boylston, Boston, Mass.
SOCKETS, Radio. See Radio Receiver Parts.

SOCKETS AND RECEPTACLES, Lamp

Bases other than Standard (or Medium) are indicated as follows: Mogul, M; Candelabra (or Miniature), C.

Key ..... See K
Composition ..... See W
Metal Shell ..... See B
Porcelain ..... See A
Pull Chain ..... See P
Push Through ..... See T
Sign Receptacles ..... See A

A. B. C. See Leviton Mfg. Co.
Acme Elec. & Mfg. Co., Canal & Hamilton Ave., Trenton, N. J. ..... A
Ajax Elec. Specialty Co., 1936 Chestnut, St. Louis, Mo. ..... W
Alabax. See Arrow Elec. Co.
Alcor Mfg. Co., 4605 W. Madison, Chicago, Ill. C
Appleton Electric Co., 1703 Wellington
Appleton Electric Co., 1730 Wellington Ave., Chicago, Ill. ..... A
Armstrong & White, 9th and Liberty Ave., Pittsburgh, Pa. ..... A
Arrow Elec. Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn. M C K T P B A
Arrograp. See Arrow Elec. Co.
Beaver Mfg. Co., 625 N. Third, Newark, N. J. ..... C . . . P B
Best. See United States Elec. Mfg. Corp.
Bryant Elec. Co., Bridgeport. ..... M C K T P B A
C-H. See Cutler-Hammer Mfg. Co.
Circle F Mfg. Co., Trenton, N. J. ..... M . . K T P B A
Circle T. See Trumbull Elec. Mfg. Co.
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn. .....
Connecticut Elec. Mfg. Co., Bridgeport, Conn. ..... M . . K T . B A
Crouse-Hinds Co., Syracuse, N. Y. ..... A W
Cutler - Hammer, Inc., 1288 St. Paul Ave., Milwaukee, Wis. ..... K T . . B A
Durex. See Wheeler Reflector Co.
Eagle Elec. Mfg. Co., 79 Hall, Brooklyn.
Far-Go Elec. Mfg. Co., 368 Broome, New York, N. Y. C
Federal Electric Co., 8700 S. State, Chicago, Ill. ..... A
Flute. See Pass & Seymour.
Flutelier. See Pass & Seymour.
Frink Co., Inc., 369 Lexington Ave., New York, N. Y. ..... M C . . . . . B .
Gaynor Elec. Co., Stratford, Conn. ..... A
General Elec. Co., Merchandise Dept., Bridgeport, Conn. ..... M C K T P B A
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn. ..... M C K T P B A
Harter. See Multi Elect. Mfg. Co.
Hoosick Falls Radio & Elec'l Parts Mfg. Co., Hoosick Falls, N. Y. ..... W
Horan Co., E. S., 550 Monroe, Carlstadt, N. J. ..... A
Hubbell, Inc., Harvey, Bridgeport, Conn. M C K T P B A
H. & H. See Hart & Hegeman.
I-D-A. See Watson Mfg. Co., J. E.
K-E Cleat Receptacle. See Kirkman.
Kirkman Engineering Co., 1 Dominick, New York. (Cleat Receptacle.) .....
Leader. See Leviton Mfg. Co.
Leiser & Co., W. A., 1607 Sansom, Philadelphia, Pa. ..... A
Leviton Mfg. Co., 226 Newell, Brooklyn, N. Y. ..... M C K . . P B A
Levolier. See McGill Mfg. Co.
Liberty Bell. See Hart & Hegeman.
Locat-A-Catch. See Connecticut.
McGill Mfg. Co., Valparaiso, Ind. ..... P B A
Majestic Elec. Mfg. Co., 806 N. 12th, St. Louis. (Lamp Receptacle.) ..... A
Molded Socket Corp., Railroad, Pa. ..... K
Multi Elec'l Mfg. Co., 1840 W. 14th, Chicago, Ill. ..... A
Multilok. See Circle F Mfg. Co.
National Bearing Metal Corp., Div. More-Jones Brass & Metal Co., 4930 Manchester Ave., St. Louis, Mo.
Newguard. See Multi Elec'l Mfg. Co.
New Wrinkle. See Bryant Elec.
Neark. See Colt's Patent Fire Arms.
One 4 All. See Propp Co., M.
P. & S. See Pass & Seymour.
Pass & Seymour, Solvay Station, Syracuse, N. Y. ..... M C K T P B A
Paulding, John I., New Bedford, Mass. ..... B A
Perkins. See Bryant Elec. Co.
Porcelain Products, Inc., Findlay, O. ..... A
Propp Co., M., 524 Broadway, New York, N. Y. .....
Quick Catch. See Hubbell, Inc.
Royal. See Sears, Henry D.
Ryan Appliance Co., 117 Mulberry, Trenton, N. J. ..... W A
Safti Soc. See Molded Socket Corp.
Sears, Henry D., 80 Boylston, Boston M C K T P B A
Security. See Circle F Mfg. Co.
Shurlock. See Pass & Seymour.
Siemen Co., Bridgeport, Conn. .....

LARGE SAMPLES FREE

Assures 100% results—

ALLEN FLUX

STICK AND PASTE

Made by world's largest and oldest manufacturers of fluxes. Takes quick bite and doesn't streak. Comes, also, in liquid, salt and oil forms.

L. B. ALLEN CO., INC.

6752 Bryn Mawr Ave., Chicago, Ill.

Tapiet Mfg. Co., 3709 Powelton Ave., Philadelphia, Pa. ..... A
Titan. See Bryant Elec. Co.
Trumbull Elec. Mfg. Co., Plainville, Conn. ..... A
Union Insul. Co., Parkersburg, W. Va. .....
United States Elec. Mfg. Corp., 222 W. 14th, New York, N. Y. ..... P . . B . . W
U. S. Electric Co., 18 Chambers, Trenton, N. J. ..... A
Walco. See Leiser & Co., W. A.
Weber. See Sears, Henry D.
Wheeler Reflector Co., 275 Congress St., Boston, Mass. ..... P
Wood Electric Co., C. D., 565 Broadway, New York. (Sign Receptacles.) ..... A
Woodwin. See Wood Elec. Co.
Wrinklet. See Bryant Elec. Co.

SOLDER, Aluminum

Allen Co., Inc., L. B., 6752 Bryn Mawr Ave., Chicago, Ill.
Aluminum Solder Corp. of America, 730 Fifth Ave., New York, N. Y.
Federated Metals Co., 233 Broadway, New York, N. Y.
Gardiner Metal Co., 1365 W. Lake, Chicago, Ill.
Lasher-Weeber Co., 241 Franklin, Boston, Mass.
Lenk Mfg. Co., 30 Merrimac, Boston, Mass.
Platt Bros. & Co., Waterbury, Conn.
Solderlume. See Aluminum Solder Corp. of America.
Supreme. See Lasher-Weeber Co.

SOLDER, Bar and Wire

Eagle. See Hoyt Metal Co.
Genuine A. See Hoyt Metal Co.
Hoyt Metal Co., St. Louis, Mo.

SOLDER, Self-Fluxing

Aluminum Co. of America, 2444 Oliver Bldg., Pittsburgh
Dutch-Boy. See National Lead Co.
Gardiner Metal Co., 1365 W. Lake, Chicago, Ill.
Kester Solder Co., 4210 Wrightwood Ave., Chicago, Ill
Lenk Mfg. Co., 32 Merrimac, Boston, Mass.
National Lead Co., 111 Broadway, New York, N. Y
Philadelphia Solder Co., 16th & Indiana Ave., Philadelphia, Pa.
Silva-Wares, Inc., 134 W. 26th St., New York, N. Y.
Solderall Co., 129 Sussex Ave., Newark, N. J.
Tinol. See American Solder & Flux Co.

SOLDER, Silver

Handy & Harman, 57 William, New York, N. Y.
Wilson Co., H. A., Newark, N. J.

SOLDERING

Compounds. See Soldering Compounds.
Irons. See Soldering Irons.
Machines. See Soldering Machines, Commutator
Pots. See Melting Pots & Ladles.
Tools. See Torches and Furnaces.

SOLDERING COMPOUNDS

Stick Paste, Flux Salts, Fluid.
Allen Co., Inc., L. B., 6752 Bryn Mawr Ave., Chicago, Ill. (Stick Paste, Salts, Aluminum Flux, Fountain Brushes.)
Amco. See American Solder & Flux Co.
American Solder & Flux Co., 2910 N. 16th, Philadelphia, Pa.
Anchor. See Garden City Laboratory.
Armstrong Ke-Ti Products Co., 491 N. Front, Columbus, O.
Benson Co., Alex R., Hudson, N. Y. (Salts and Paste.)
Burnley Battery & Mfg. Co., North East, Pa. (Paste and Stick.)
Brunner Chemical Wks., 217 E. 3rd, Cincinnati, O.
Callahan & Co., Geo., 218 Front, New York. (Fluid.)
Central Stamping Co., 206 Broadway, New York, N. Y Paste and Salts.
Challenge. See Highland Electro Chemical Co
Chase Brass & Copper Co., 236 Grand, Waterbury, Conn.
Conductalute. See Technical Products Co.
Crescent. See McGill Mfg. Co.
Dielectric Mfg. Co., St. Louis, Mo.
Dunton Co., M. W., Providence, R. I.
Dutch-Brand. See Van Cleef Bros.
Eureka. See Grasselli Chemical Co.
Firth Radio Corp., 25 Beaver, New York, N. Y.
Fluxite. See Monarch Products Co.
Garden City Laboratory, 300 W. Adams, Chicago, Ill.
General Elec. Co., Bridgeport, Conn. (Paste).
Grasselli Chemical Co., Guardian Bldg., Cleveland, O.
Highland Electro Chemical Mfg. Co., Connellsville, Pa (Paste, Stick, Salts.)
Incomparable. See Reade Mfg. Co.
Kester Solder Co., 4210 Wrightwood Ave., Chicago, Ill.
Leveridge, Inc., Chas. W., 246 Fulton, New York, N. Y
Lotan Research Corp., 6545 Euclid Ave., Cleveland, O.
Luco. See Lukens Metal Co.
Lukens Metal Co., T. F., 1105 Fairmount Ave., Philadelphia, Pa.
McGill Mfg. Co., Valparaiso, Ind. Fluid.
Mitchell-Rand Mfg. Co., 19 Vesey, New York. (Paste.)
Neutral. See Dielectric Mfg. Co.
New-Idea. See Hartwig Co., Wm. J.
Nokorode. See Dunton Co., M. W.
Oakwood. See Weaver Specialty Co.
Paragon Insulating Co., 5716 Euclid Ave., Cleveland, O

Fair Haven Marble & Marbleized Slate Co.

Fair Haven Vermont

SLATE GOODS

For those who want the best

SOLDERING FLUID

Non-poisonous, non-corrosive, economical, quick acting. Shipped in tin. A liberal sample free.

The Ruby Chemical Company Columbus, Ohio

Electrical SLATE

Large Stocks — Quick Deliveries. Send your Slate orders to us.

DAVIS SLATE & MFG. CO.

618 East 40th St., Chicago, Ill.

OHMITE

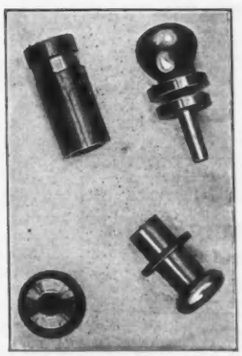
new REFERENCE BOOK

Invaluable to every Electrical or Radio Engineer.
Send for your copy . . . no charge.

Ohmite Manufacturing Co.
633 N. Albany Ave., Chicago, Ill.

DEPENDABLE SPRINGS
for every electrical requirement
by
PECK

. . and AUTOMATIC SCREW MACHINE PARTS



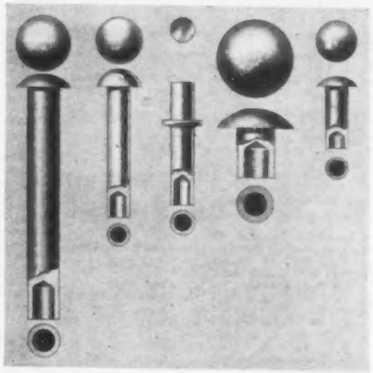
Electrical manufacturers can obtain every conceivable type of dependable spring from Peck. Here advanced production methods, under careful supervision, are at your disposal. We carry great stocks of spring material to insure prompt attention to any order for any quantity.

Peck can produce any type of automatic screw machine part in any size, in brass, bronze, nickel-silver, or steel, up to 1¼ in. in diameter.

THE PECK SPRING COMPANY
Plainville, Conn.

in all metals

Special
Nails
Rivets
Drive Screws and
Machine Screws



Electrical Manufacturers

Send for New Catalogue
Illustrating Our Products

JOHN
HASSALL
INC.

Established 1850
402 OAKLAND STREET
BROOKLYN, N. Y.

SOLDERING COMPOUNDS—Continued
Perfecto. See Fifth Radio Corp.
Pfanstiehl Chemical Co., Waukegan, Ill. Paste, Salts, Sticks, Fluid, Oil, and Solid Sal Ammoniac.
Queens. See Brunner Chemical Works.
Reade Mfg. Co., 133 Hoboken Ave., Jersey City, N. J. (Fluids, Salts, Paste).
Redina. See Reade Mfg. Co.
Red-Letter. See Ruby Chemical Co.
Rodale Mfg. Co., 200 Hudson, New York, N. Y. (Paste.)
Rotax Mfg. Co., Bathgate Place, Newark, N. J.
Ruby Chemical Co., Columbus, O.
Ruby Fluid. See Ruby Chemical Co.
Salbrick. See American Solder & Flux Co.
Snarr & Co., Geo. W., 110 S. Ninth, St. Louis, Mo. (Paste.)
Snowflake. See Grasselli Chemical Co.
Snowflake. See Highland Electro Chemical Co.
Solderine. See Central Stamping Co.
Solderite, Inc., 22 Green, Newark, N. J.
Speco. See Pfanstiehl Chemical Co.
Standard. See Grasselli Chemical Co.
Star. See McGill Mfg. Co.
Superior. See Highland Electro Chemical Co.
Technical Products Co., 2308 Main, Pittsburgh, Pa. (Paste.)
Tinol. See American Solder & Flux Co.
Van Cleef Bros., 7722 Woodlawn Ave., Chicago, Ill.
Weaver Specialty Co., 6344 Aurelia, Pittsburgh, Pa.
Yager's. See Benson Co., Alex. R.
Yankee. See Leveridge, Inc., Chas. W.

SOLDERING IRONS

Acme Elec. Heating Co., Dept. R, 1217 Washington, Boston.
Adroit. See Adroia Corp.
Adroia Corp., Port Jefferson, N. Y.
American Beauty. See American Elecl. Heater Co.
American Elecl. Heater Co., Woodward & Burroughs Ave., Detroit, Mich.
Beardsley & Wolcott Mfg. Co., Waterbury, Conn.
Beckwith Machine Co., 402 Chestnut, Ravenna, Ohio.
Betsy Ross. See Central Flatiron Mfg. Co.
Brach Mfg. Corp., L. S., Newark, N. J.
Burnley Battery & Mfg. Co., North East, Pa.
Central Flatiron Mfg. Co., Johnson City, N. Y.
Chapman Machine Co., Terryville, Conn.
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee.
Davis Specialty Works, East Gary, Ind.
Dominion Elec'l Mfg. Co., 712 Ontario Ave., N., Minneapolis.
Dover Mfg. Co., Dover, O.
Drake Elec. Wks., 3943 Lincoln Ave., Chicago, Ill.
Electrahot Mfg. Co., 525 S. 4th, Minneapolis, Minn.
Electric Heat Control Co., 5902 Carnegie Ave., Cleveland. (Transformer Soldering Outfit.)
Electric Soldering Iron Co., Inc., 135 W. 17th, New York.
Enco. See Electrical Necessities Corp.
Esico. See Electric Soldering Iron Co.
Everhot. See Swartzbaugh Mfg. Co.
Ever-Ready. See Gold Seal Elec. Co.
General Electric Co., Schenectady, N. Y.
Gold Seal Elecl. Co. of Ohio, Inc., 250 Park Ave., New York, N. Y.
Home. See Majestic Elec. Appliance Co.
Illinois Stamping & Mfg. Co., 220 N. Jefferson, Chicago, Ill.
Industrial. See Permway Mfg. Co.
Jiffy. See Koch & Co., Paul W.
King. See Electric Heat Control Co.
Koch Co., Paul W., 19 S. Wells, Chicago. (Solder Dipper.)
Landers, Frary & Clark, New Britain, Conn.
Lenk Mfg. Co., 30 Merrimac, Boston, Mass.
Lotan. See Simplex Flux & Solder Co. of America.
Lucifer. See Jones Point Tool & Elec. Co.
Majestic Electric Appliance Co., San Francisco, Cal.
Manning-Bowman & Co., Meriden, Conn.
Moto-Ray Mfg. Co., 169 Massachusetts Ave., Boston, Mass.
National Specialties Co., Howell & Tyler Sts., Fort Wayne, Ind.
Northern Elec. Co., 2833 N. Western Ave., Chicago, Ill.
Queen Quality. See Watlow Elec. Mfg. Co.
Quick-Hot. See Moto-Ray Mfg. Co.
Reliance. See Landers, Frary & Clark.
Samson-United Corp., Probert, Rochester, N. Y.
Silver King. See Illinois Stamping & Mfg. Co.
Simplex Div. of Edison General Elec. Appliance Co., Inc., 5600 W. Taylor, Chicago, Ill.
Simplex Flux & Solder Co. of America, 1965 E. 66th, Cleveland, O.
Sta-Warm. See Beckwith Machine Co.
Superior Elec. Products Corp., 1309 S. 13th, St. Louis, Mo.
Swartzbaugh Mfg. Co., 1501 W. Bancroft, Toledo, O
Torrid. See Beardsley & Wolcott Mfg. Co.
Trent, Harold E., 295 N. Lawrence, Philadelphia, Pa.
Varick Elec. Mfg. Co., 28 E. 21st St., New York, N. Y.
Vulcan Elec. Heating Co., 225 Varick, New York, N. Y.
Waage Elec. Co., 5100 W. Ravenswood Ave., Chicago, Ill.
Ward Mfg. Co., 937 Wellington Ave., Chicago, Ill.
Watlow Elec. Mfg. Co., 1320 N. 23rd, St. Louis, Mo
Wellmade Elec. Co., Torrington, Conn.

SOLDERING MACHINES, Commutator

(For production soldering of small commutators).
Allatonce. See Chapman Electric Works, P. E.
Chapman Electric Works, P. E., 1820 Chouteau Ave., St. Louis, Mo.

SOLENOIDS. See Coils
SOLVENTS & REDUCERS, VARNISH. See Paint, Varnish, Lacquer.
SPAGHETTI. See Tubing, Varnished Fabric.
SPEED CHANGING UNITS. See Gears (Speed Changing Units).
SPEED INDICATORS. See Tachometers.
SPOOLING MACHINES, WIRE. See Wire Manufacturing Machines.

SPRAYING OUTFITS

Airmode. See Reliable Mfg. Co.
Airway. See Binks Spray Equip. Co.
Atomister Corp., 21 Hamilton, Rahway, N. J.
Beach Air Brush Co., Willard C., Harrison, N. J.
Binks Mfg. Co., 3114 Carroll Ave., Chicago, Ill.
Breuer Electric Mfg. Co., 852 Blackhawk, Chicago, Ill.
De Vilbiss Co., 3750 Detroit Ave., Toledo, Ohio.
Eclipse Air Brush Co., 79 Orange, Newark, N. J.
Eisler Electric Corp., 770 S. 13th St., Newark, N. J.
Electric Sprayit Co., 320 E. Colfax Ave., South Bend, Ind.
Eureka Sprayers, Inc., 87-28 130th, Long Island City, N. Y.
Gast Mfg. Corp., Bridgman, Mich.
Globe Mfg. Co., Battle Creek, Mich.
Hobart Mfg. Co., Simpson & Penn Sts., Troy, Ohio.
Hurley. See Binks Mfg. Co.

46

LEE-BUILT SPRINGS
For Every Purpose
LEE SPRING CO., INC.
34 Main St., Brooklyn, N.Y.

Ideal Air Brush Mfg. Co., 270 Lafayette, New York, N. Y.
Kellogg Mfg. Co., 97 Humboldt, Rochester, N. Y.
Koch Bros. Mfg. Co., 2339 Nelson, Chicago, Ill.
K. B. See Koch Bros. Mfg. Co.
Metal Specialties Mfg. Co., 338 N. Kedzie Ave., Chicago.
Macleod Co., 2232 Bogen, Cincinnati, O.
Matthews Corp., W. N., 3722 Forest Park Blvd., St. Louis, Mo.
Paasche Air Brush Co., 1909 Diversey Parkway, Chicago, Ill.
Paint-O-Mister. See Atomister Corp.
Pioneer Air Compressor Co., 243 Canal, New York, N. Y.
Presto. See Metal Specialties Mfg. Co.
Reliable Mfg. Co., Dwightway & Fourth St., Berkeley, Cal.
Sharpe Mfg. Co., 1356 S. Flower, Los Angeles, Cal.
Simons Paint Spray Brush Co., 17 Maryland Ave., Dayton, O.
Simplex Spray Equipment Co., 552 W. Lake, Chicago, Ill
Sprago, Inc., Somerville, Mass.
Spray-All. See United States Air Compressor Co.
Sprayit. See Electric Sprayit Co.
United States Air Compressor Co., 5300 Howard Ave., Cleveland, O.
Wold Air Brush Mfg. Co., 2173 N. California Ave., Chicago, Ill.

SPREADERS, COIL & LOOP. See Winding Machines, Armature & Field Coil.

SPRING MAKING MACHINES

Sleeper & Hartley, Inc., Worcester, Mass.

SPRINGS

Advance Spring & Wire Co., Carroll Ave. & Wood St., Chicago.
American Spiral Spring & Mfg. Co., Arsenal Sta., Pittsburgh, Pa.
American Spring & Mfg. Co., Holly, Mich.
Barnes Co., Wallace, Bristol, Conn.
Barnes-Gibson-Raymond, Inc., 6400 Miller Ave., Detroit.
Cary Spring Works, Inc., 240 W. 20th St., New York, N. Y.
Cleveland Wire Spring Co., Cleveland, O.
Cook Spring Co., Ann Arbor, Mich.
Cuyahoga Spring Co., Berea Rd., Cleveland, O.
Dunbar Bros. Co., Bristol, Conn.
Eureka Tinware Mfg. Co., 135 W. 20th, New York, N. Y.
Fischer Spring Co., Chas., 238 Kent Ave., Brooklyn, N. Y.
Flexo Spring Mfg., Inc., 44 South First, Brooklyn, N. Y.
Gibson Co., Wm. D., 1800 Clybourn Ave., Chicago, Ill.
Hubbard Spring Co., M. D., Pontiac, Mich.
Humason Mfg. Co., Forestville, Conn.
Hunter Pressed Steel Co., Lansdale, Pa.
Kokomo Spring Co., Kokomo, Ind.
Lee Spring Co., 34 Main, Brooklyn, N. Y.
Mattatuck Mfg. Co., Waterbury, Conn.
Miller & Van Winkle, Inc., 18 Bridge, Brooklyn, N. Y.
Newcomb Spring Corp., 234 40th, Brooklyn, N. Y.
Peck Spring Co., Plainville, Conn.
Peterson Spring Co., 1660 Beard Ave., Detroit, Mich.
Rapid Spring Co., 222 Second Ave., Pittsburgh, Pa.
Raymond Mfg. Co., Corry, Pa.
Standard Spring and Manufacturing Co., 236-42nd St., Brooklyn, N. Y.
Steinen & Co., 297 Washington, Newark, N. J.
Yost Superior Co., Springfield, O.
Young Industries, Inc., L. A., Detroit, Mich.

STAMPED BOXES. See Cabinets, Sheet Steel.

STAMPINGS, Fibre. See Fibre.
Sheet Metal. See Fixture Fittings.
Sheet Steel. See Stampings, Sheet Steel.
Small. See Stampings, Small.

STAMPINGS, Sheet Steel

Heavy Stamping and Drawing.
Acklin Stamping Co., 1125 Nebraska, Toledo, O.
American Stamping Co., 278 E. 64th, Cleveland, O.
Bartlett-Thompson Co., 67 Sudbury, Boston, Mass.
Bossert Corp., 1002 Oswego St., Utica, N. Y.
Challenge Stamping & Porcelain Co., Grand Haven, Mich.
Detroit Metal Specialty Co., 1651 Beard, Detroit, Mich.
Eureka Tinware Mfg. Co., 135 W. 20th, New York, N. Y.
Faries Mfg. Co., Decatur, Ill.
Fischer Spring Co., Chas., 238 Kent Ave., Brooklyn, N. Y.
Geuder, Paeschke & Frey, 1392 St. Paul Ave., Milwaukee.
Hubbard & Co., Pittsburgh, Pa.
Hunter Pressed Steel Co., Lansdale, Pa.
Janney, Jr., Joseph A., 1421 Chestnut St., Philadelphia.
Lansing Stamping Co., Lansing, Mich.
Massachusetts Machine Shop, Inc., Boston, Mass.
Mathews Mfg. Co., 104 Gold, Worcester, Mass
Metal Specialty Co., 1553 Riverside Drive, Cincinnati, O.
Metropolitan Devices Corp., 1250 Atlantic Ave., Brooklyn
Mullins Mfg. Corp., Salem, Ohio. (Vitreous Enameled.)
Seymour Products, Seymour, Conn.
Thomas & Skinner Steel Products Co., 1102 E. 23rd, Indianapolis, Ind.
Truseon Steel Co., Youngstown, O.
United States Stamping Co., Moundsville, W. Va.
Worcester Stamped Metal Co., Worcester, Mass.

STAMPINGS, Small

Small Stamped Metal Parts for Electrical Devices
Advance Tool & Die Casting Co., 1654 Holton, Milwaukee
Aerial Machine & Tool Co., 79 Grand, New York, N. Y.
American Radio Hardware Co., 135 Grand, New York, N. Y.
American Stamping Co., 278 E. 64th, Cleveland, O.
Arrow Automatic Products Corp., 27 Vestry, New York, N. Y.
Barnes Co., Wallace, Bristol, Conn.
Beaver Mfg. Co., 625 N. Third, Newark, N. J.
Bridgeport Brass Co., 774 E. Main, Bridgeport, Conn.
Bull Dog Electric Products Co., Detroit, Mich.
Chase Brass & Copper Co., Waterbury, Conn.
Cinch Mfg. Corp., 2335 W. Van Buren, Chicago, Ill.
Clarke Metal Products, Inc., 490 Hancock Ave., Bridgeport, Conn.
Detroit Metal Specialty Co., 1651 Beard, Detroit, Mich.
Diamant & Tool Mfg. Co., 401 Mulberry, Newark, N. J.
Elco Tool & Screw Corp., 1818 Broadway, Rockford, Ill.
Eureka Tool & Machine Co., Newark, N. J.

47

INDUSTRIAL SOLDERING IRONS
Priced at $5.00 and up
THE CHAPMAN MACHINE CO., Terryville, Conn.

SPRINGS
Coiled wire springs; special shapes from brass, phosphor bronze, chrome vanadium, music, hard drawn or oil tempered wire. Also Cadmium plated springs.
by Hunter
HUNTER PRESSED STEEL CO.
Lansdale, Pa.

Faries Mfg. Co., Decatur, Ill.
Fischer Spring Co., Chas., 238 Kent Ave., Brooklyn, N. Y.
Geuder, Paeschke & Frey, 1392 St. Paul Ave., Milwaukee.
Gramines & Sons, Inc., L. B., Allentown, Pa.
Gray Bros. Co., Piano, Ill.
Great Lakes Pressed Steel Corp., 1410 Niagara, Buffalo, N. Y.
Hubbard Spring Co., M. D., Pontiac, Mich.
Humason Mfg. Co., Forestville, Conn.
Hunter Pressed Steel Co., Lansdale, Pa.
Imperial Electrical Co., Union City, Ind
Kirschner's Mfg. Co., 255 Calyer, Brooklyn, N. Y.
Lansing Stamping Co., Lansing, Mich.
Lenz Metal Stamping Wks., J., 192 Franklin, New York
Marion Elec. Mfg. Co., 24 Cliff, Jersey City, N. J.
Massachusetts Machine Shop, Inc., Boston, Mass.
Mathews Mfg. Co., 104 Gold, Worcester, Mass.
Mattatuck Mfg. Co., Waterbury, Conn.
McDowell Mfg. Co., Millvale Sta., Pittsburgh, Pa.
Mechanics Tool & Stamping Co., 7 Summer, Worcester, Mass
Melaun Mfg. Co., 144 E. Morris, Indianapolis, Ind.
Monowatt Electric Corp., 24 W. 40th, New York, N. Y.
Mutual. See Bull Dog Elec. Products Co.
Patton-MacGuyer Co., Providence, R. I.
Paul & Beckman Mfg. Co., 1736 N. Fifth, Philadelphia, Pa
Plume & Atwood Mfg. Co., 474 Bank, Waterbury, Conn.
Precision Metal Workers, 3100 Carroll Ave., Chicago, Ill.
Premax Products, Inc., 230 Tenth, Niagara Falls, N. Y.
Quadriga Mfg. Co., 213 W. Grand Ave., Chicago, Ill
Ribaysen Mfg. Co., J., 4442 Roosevelt Rd., Chicago, Ill.
Ridon Mfg. Co., Naugatuck, Conn.
Schollhorn Co., Wm., New Haven, Conn.
Scovill Mfg. Co., Waterbury, Conn.
Sharples Separator Co., Riddle & Patten Ave., Westchester, Pa.
Sherman Mfg. Co., H. B., Battle Creek, Mich.
Signal Elec. Mfg. Co., Menominee, Mich.
Soss Mfg. Co., Roselle, N. J.
Steinen & Co., 297 Washington, Newark, N. J.
Thomas & Skinner Steel Products Co., 1102 E. 23rd, Indianapolis, Ind.
United Stamping & Mfg. Co., Cleveland, Ohio.
United States Stamping Co., Moundsville, W. Va.
Valley Appliances, Inc., 634 Lexington Ave., Rochester, N. Y.
Waterbury Brass Goods Corp., Waterbury, Conn
Waterbury Button Co. (Elecl. Mfg. Div.), Waterbury, Conn.
Waterbury Mfg. Co., 236 Grand, Waterbury, Conn.
Waterbury Metal Wares Co., Waterbury, Conn.
Western Cartridge Co., East Alton, Ill.
Worcester Stamped Metal Co., Worcester, Mass.
Zierick Machine Wks., F. R., 68 E. 131st St., New York, N. Y.

STANDS, Armature

Columbia Machine Works & Malleable Iron Co., Atlantic Ave. and Chestnut St., Brooklyn, N. Y.
Electric Service Supplies Co., 17 & Cambria Sts., Philadelphia, Pa.
Onan, David W., 43 Royalstone Ave., Minneapolis, Minn.
Peerless. See Electric Service Supplies Co.
Ridlon Company, Frank, Boston, Mass.
Weisenhoff, Joseph, 4352 Roosevelt Rd., Chicago, Ill.

STARTERS, Motor. See Controllers, Motor; Switches, Remote Control; Switches, Knife; Safety; Switches, Snap. (Heavy Duty).
STEATITE. See Cores, Resistance Coil.
STEEL CASTINGS. See Castings, Steel.

STEEL for Electric Appliances

Elyria Iron & Steel Co., Elyria, O.
Ryerson & Son, Jos., 2558 W. 16th, Chicago, Ill.

STEEL, Magnet

Ajax Electrothermic Corp., Trenton, N. J.
Hercules Elec. Steel Corp., 145 Lafayette St., New York.
Indiana Steel Products Co., 4545 S. Western Ave., Chicago.
Ludlum Steel Co., Watervliet, N. Y.
Reed Co., Jr., David, 85 Adams, Brooklyn, N. Y.
Swedmag. See Reid Co., Jr., David.

STEEL SHEETS

Agathon. See Republic Iron & Steel Co.
Allegheny Steel Co., Brackenridge, Pa.
American Sheet & Tin Plate Co., Frick Bldg., Pittsburgh.
Armco. See International Corp., Middletown, O.
Armelec. See Empire Steel Corp.
Cyclops Steel Co., Titusville, Pa.
Dynelec. See Empire Steel Corp.
Empire Steel Corp., Mansfield, O.
Firth-Sterling Steel Co., McKeesport, Pa.
Manelec. See Empire Steel Corp.
Metelec. See Empire Steel Corp.
Newport Rolling Mill Co., Newport, Ky.
Polelec. See Empire Steel Corp.
Republic Iron & Steel Co., 335 Market, Youngstown, O.
Tranelec. See Empire Steel Corp.
Unilov. See Universal Steel Co.
Universal Steel Co., Bridgeville, Pa.
Wheeling Steel Corp., Wheeling, W. Va.

STEEL, STRIP. See Strip Steel.

STOCKS, Dies and Reamers

Hall-Will, Inc., Twelfth & Cranberry, Erie, Pa.
Red-E-Hall. See Hall-Will, Inc
Toledo Pipe Threading Machine Co., 1445 Summit, Toledo, O.

STONES, Commutator

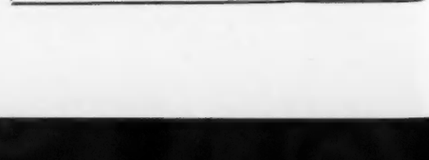
Acme. See Green Equipment Corp.
Caro. See Electric Service Supplies Co.
Cleveland Stone Co., Union Trust Bldg., Cleveland, O.
Co-operative Utilities Co., 1503 Columbia Ave., Philadelphia, Pa.
Diamond Dee. See Co-operative Utilities Co.
Electric Service Supplies Co., 17th and Cambria, Philadelphia, Pa.
Green Equipment Corp., 260 Monadnock Block, Chicago, Ill.
Ideal Commutator Dresser Co., 1039 Park Ave., Sycamore, Ill.
Imperial. See Martindale Electric Co.
Lombard & Co., Somerville, Mass.
Martindale Elec. Co., 1262 W. Fourth, Cleveland, O.

STOOLS, Factory; Steel

Angle Steel Stool Co., Plainwell, Mich.
Chicago Wire Chair Co., 613 N. La Salle, Chicago, Ill.
Royal Metal Mfg. Co., 1140 South Michigan Ave., Chicago.

STORAGE
Battery Plates. See Plates, Storage Battery.

48


THE CHAS. FISCHER SPRING COMPANY
Springs of every description. Flexible Shafts, Metal and Wire Specialties. Write for prices.
238 KENT AVE., BROOKLYN, N.Y.

TO ANY SPRING USER

Consider *carefully* the advantage of placing your requirements with an organization operating two distinct plants... each fully equipped to meet easily the needs of any electrical device for flat or wire springs, small stampings or formed wires.

Address your inquiry to either division

BARNES-GIBSON-RAYMOND, INC.

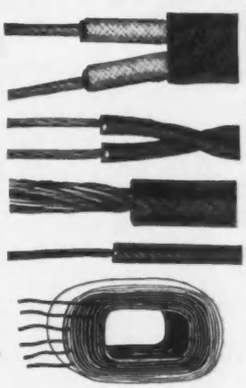
COOK SPRING CO. DIV.
ANN ARBOR, MICHIGAN

DETROIT DIVISION
6400 MILLER AVENUE

OUR
Insulated Wire Strippers
—A Big Help At Low Cost—
Guaranteed by Trial

We specialize on equipment for removing insulation from any wire or coil lead as required for any electrical connection.

One of our motor driven tools will save you time, money and trouble, and improve quality of work. Let us suggest the best equipment for your job. Descriptive bulletin and low prices mailed on request.



The Wire Stripper Company
507 Erie Bldg., Cleveland, Ohio

AT OUR NEW ADDRESS

We have larger quarters and greater facilities for the manufacture of

NON-RUSTING AND STANDARD THERMOSTATIC METALS. ALSO CONTACT POINTS IN PLATINUM, SILVER AND ALLOYS.

INTERSTATE PRODUCTS CORP.
503 MULBERRY STREET
(Old address—29 Commercial St.)
NEWARK, N. J.

REFLECTORS

AGA Chromium Plated Metal Reflectors are not costly and they provide increased reflector efficiency, being readily adaptable to standard assemblies. Non-tarnishing and heat-resisting.

SEND US YOUR REFLECTOR PROBLEMS NOW.

AGA

AGA AUTO LAMP CO., Inc.
Successors to Gray & Davis, Inc., Lamp Division
AMESBURY, MASS.

STORAGE—Continued
Battery, Separators. See Separaters.
Tools. See Tools, Storage Battery.
STRAINING MACHINES, INSULATION. See Wire Manufacturing Machines.

STRAIGHTENERS, Armature Shaft

Columbia Machine Works & Malleable Iron Co., Atlantic Ave. and Chestnut St., Brooklyn, N. Y.
STRANDING MACHINES. See Wire Manufacturing Machines.

STRIP STEEL

(Hot and Cold Roll).
Acme Steel Co., 2832 Archer Ave., Chicago, Ill. (Hot & Cold).
American Steel & Wire Co., 208 S. La Salle, Chicago, Ill. (Cold).
Athenia Steel Co., 135 William, New York, N. Y. (Cold.)
Barnes Co., Wallace, Bristol, Conn. (Hot.)
Griffin Mfg. Co., Huron & Cherry, Erie, Pa. (Cold.)
Laclede Steel Co., Arcade Bldg., St. Louis, Mo. (Hot.)
Latrobe Electric Steel Co., Latrobe, Pa. (Hot & Cold.)
Republic Iron & Steel Co., 335 Market, Youngstown, O.
Sharon Steel Hoop Co., Sharon, Pa. (Hot.)
Stanley Wks., New Britain, Conn. (Hot & Cold.)
Steel and Tubes, Inc., Cleveland, O. (Hot & Cold.)
Superior Steel Corp., Union Trust Bldg., Pittsburgh, Pa. (Hot & Cold.)
Thomas Steel Co., Warren, Ohio.
West Leechburg Steel Co., Farmers Bank Bldg., Pittsburgh, Pa. (Hot & Cold.)

STRIPPERS, Wire

Acme. See A. Laubscher.
Ace Engineering Co., 115 Brown, Milwaukee, Wis. (Cutting, Stripping and Measuring).
Austin Co., M. B., 108 S. Desplaines, Chicago, Ill.
Carlander, Henry, 508 W. 146th, New York, N. Y.
Colonial-Premier Co., 229 W. Ohio, Chicago, Ill.
Dicke Tool Co., Downers Grove, Ill.
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
E-Z. See Pyramid Products Co.
F. F. See France Mfg. Co.
France Mfg. Co., 10306 Beres Rd., Cleveland. (Motor Driven.)
Goehst. See Klein & Son.
Hertman. See Service Sales & Mfg. Co.
Ideal Commutator Dresser Co., 1039 Park Ave., Sycamore, Ill.
Ives Mfg. Co., Meriden, Conn.
Klein & Sons, Mathias, Chicago, Ill.
Laubscher, A., 77 Fort Pleasant Ave., Springfield, Mass.
Perfection. See Weber Machine Corp.
Pyramid Products Co., 2311 S. State, Chicago, Ill.
Service Sales & Mfg. Co., 3405 W. 159th, Cleveland, O.
speedcrat. See Wire Stripper Co.
Thomas Steel Products Co., Warren, Ohio.
Weber Machine Corp., 33 S. Water, Rochester, N. Y.
Wire Stripper Co., 507 Erie Bldg., Cleveland, O. (Motor Driven Wire Stripper & Wire Twister.)
Zierick Machine Wks., F. R., 6 Howard, New York City. (Motor Driven Stripper & Twister).
SWITCHBOARD INSTRUMENTS. See Instruments, Portable and Switchboard.
SWITCHBOARD OPALS. See Lenses.
SWITCHBOARDS, SLABS AND BARRIERS
See Asbestos Slabs; Molded Insulation; Slate; Soapstone.

SWITCH (Switches)

Arms. See Posts, Binding.
"Across the Line" Type. See Controllers, Motor.
Baby Knife. See Switches, Battery.
Battery. See Switches, Battery.
Canopy. See Switches, Snap.
Clock Operated. See Switches, Time.
Feed Through. See Switches, Snap.
Fixture. See Switches, Snap.
Float. See Switches, Tank.
Flush. See Switches, Snap.
Handles. See Handles, Wood
Knife, Baby. See Switches, Battery & Baby Knife.
Lever Radio. See Radio Mounting.
Lever. See Switches, Snap, Lever.
Limit. See Controllers, Motor.
Mercury. See Switches, Mercury
Motor Starting. Magnetic Type. See Controllers.
Motor Starting. Non-Magnetic. See Switches, Motor Starting.
Pendant. See Switches, Snap.
Pressure Regulating. See Controllers.
Push Button, Snap. See Switches, Snap.
Push Button, Motor Starting. See Switches, Remote Control
Radio Receiver. See Radio Mountings.
Range. See Switches Snap; Heavy Duty
Remote Control. See Switches, Remote Control.
Reversing. See Controllers.
Rotary. See Switches, Snap.
Safety. See Switches, Knife.
Snap. See Switches, Snap.
Starter Type. See Controllers.
Storage Battery. See Switches, Storage Battery.
Surface. See Switches, Snap.
Tank. See Switches, Tank
Time. See Switches, Time.
Toggle. See Switches, Snap.
Tumbler. See Switches, Snap.

SWITCHES, Battery and Baby Knife

Cut-Out Switches.
Anti-Wood. See Keil & Son, Francis.
Bridgeport Switch Co., 209 Center, Bridgeport, Conn.
Bryant Electric Co., Bridgeport, Conn.
Chapman. See Frank W. Morse & Co.
Jefferson Electric Co., 1503 S. Laflin, Chicago, Ill.
Circle T. See Trumbull Elec. Mfg. Co.
Connecticut Elec. Mfg. Co., Bridgeport, Conn.
Crown. See Edwards & Co., Inc.
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee.
Diamond H. See Hart Mfg. Co.
Edwards & Co., Inc., 140th & Exterior, New York, N. Y.
Electrad, Inc., 428 Broadway, New York, N. Y.
Eureka. See Frank W. Morse & Co.
Fahnestock Elec. Co., cor. East Ave. and 8th, Long Island City, N. Y.
Handy. See Chicago Elec. Mfg. Co.
H. & H. See Hart & Hegeman Div.
Hart Mfg. Co., Hartford, Conn.
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co. Hartford, Conn. (Push Button.)
Harwood. See Frank W. Morse & Co.
Heinemann Elec. Co., Trenton, N. J.
Jefferson Elec. Co., 1500 S. Laflin, Chicago, Ill.
Jost. See Frank W. Morse & Co.
Kappa. See Trumbull Elec. Mfg. Co.
Keil & Son, Francis, 401 E. 163rd, New York, N. Y.
Kendrick & Davis Co., Lebanon, N. H.
Keystone. See Frank W. Morse & Co.
King Mfg. Co., B. C., 302 Park Ave., Brooklyn, N. Y.
Knox Porcelain Corp., Knoxville, Tenn.
K-P-F Elec. Co., 855 Howard St., San Francisco, Cal.
Kurz & Root, Appleton, Wis.

Leviton Mfg. Co., 226 Newell, Brooklyn, N. Y.
Lyons Mfg. Co. (Mt. Carmel), New Haven, Conn.
Majestic Elec. Mfg. Co., 80 N. 12th St., St. Louis, Mo.
Morse Co., Frank W., Boston, Mass.
Partrick & Wilkins Co., Philadelphia, Pa.
Porcelain Products, Inc., Findlay, Ohio.
Powerlite Switchboard Co., 4149 E. 79th, Cleveland, O.
Pulirite. See Frank W. Morse & Co.
Reliable Electric Co., 3145 Carroll Ave., Chicago, Ill.
Samson Electric Co., Canton, Mass.
Spero Elec. Mfg. Co., E. 33rd and Woodland Ave., Cleveland.
Sta-Rite. See Frank W. Morse & Co.
Trumbull Elec. Mfg. Co., Plainville, Conn.
Wood Elec. Co., C. D., 565 Broadway, New York, N. Y.

SWITCHES, Mercury

(For Temperature Control Apparatus.)
Con-Tac-Tor. See Time-O-Stat Controls Co.
Dunco. See Struthers Dunn, Inc.
Fabrice Thermostatic Control Co., 4750 Sheridan Rd., Chicago, Ill.
General Electric Vapor Lamp Co., 883 Adams, Hoboken, N. J.
General Kontrolar Co., 200 E. First, Dayton, O.
Hywatt. See Time-O-Stat Controls Co.
Leland Electric Co., Dayton, O.
Kontax. See General Kontrolar Co. & Leland Electric Co.
Kontrolar. See General Kontrolar & Leland Electric Co.
Machlett & Son, 50 William, Long Island City, N. Y.
Mercoid Corp., 564 W. Adams, Chicago, Ill.
Safety Regulator Co., 529 S. Mathews, Los Angeles, Cal.
Struthers Dunn, Inc., 138 N. Juniper, Philadelphia, Pa.
Time-O-Stat Controls Co., Elkhart, Ind.

SWITCHES, Motor Starting

Accessible. See Trumbull-Vanderpoel Elec. Mfg. Co.
Aces. See Colt's Patent Fire Arms Mfg. Co.
Adam Elec. Co., Frank, St. Louis, Mo.
Aurora Steel Products Co., Aurora, Ill.
Automatic Switch Co., 154 Grand, New York, N. Y.
Barber Elec. Mfg. Co., North Attleboro, Mass.
Bull Dog Electric Products Co., Detroit, Mich.
Circle T. See Trumbull Elec. Mfg. Co.
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.
Columbia Metal Box Co., 226 E. 144th, New York, N. Y.
Crouse-Hinds Co., Syracuse, N. Y.
E. W. See Trumbull Elec. Mfg. Co.
FA. See Adam Elec. Co., Frank.
F. A. Triumph. See Metropolitan Elec. Mfg. Co.
Federal Steel Products Co., 3 Ave. L., Newark, N. J.
Large-Dall Mfg. Co., 311 N. Tenth, Philadelphia, Pa.
Leonard Elec. Mfg. Co., 2907 Perkins Ave., Cleveland, O
Lundy Co., E. A., Fulton Bldg., Pittsburgh.
MacMillen Mfg. Co., 1400 N. Spring, Los Angeles, Cal.
Major. See Adam Elec. Co., Frank.
Mason. See Trumbull-Vanderpoel Elec. Mfg. Co.
Metropolitan Device Corp., 1250 Atlantic Ave., Brooklyn, N. Y.
Metropolitan Elec. Mfg. Co., Blvd. at 14th, Long Island City, N. Y.
Murray. See Metropolitan Device Corp.
Mutual. See Bull Dog Elec. Products Co.
Naro. See Metropolitan Elec. Mfg. Co.
Noark. See Colt's Patent Fire Arms Mfg. Co.
Nublade. See Colt's Patent Fire Arms Mfg. Co.
Palmer Elec. & Mfg. Co., Waltham, Mass.
Robbins & Myers, Inc., Springfield, O.
Safe-Lock. See Trumbull-Vanderpoel Elec. Mfg. Co.
Safelock. See Westinghouse Elec. & Mfg. Co.
Schmuckler & Sons, 2232 N. 28th, Philadelphia, Pa.
Square D Co., Detroit, Mich.
S. S. See Wadsworth Elec. Mfg. Co.
Tanner & Co., Wm. F., 511 Sharp, Baltimore, Md.
Trumbull Elec. Mfg. Co., Plainville, Conn.
Trumbull-Vanderpoel Elec. Mfg. Co., Bantam, Conn.
T. V. Safelock. See Trumbull-Vanderpoel Elec.
Unisafti. See Metropolitan Device Corp.
Unit-Versal. See Bull Dog Elec. Products Co.
Universal Metal Box & Products Co.
V. V. Fittings Co., 711 Cherry, Philadelphia, Pa.
Wadsworth Elec. Mfg. Co., Covington, Ky.
Westinghouse Elec. & Mfg. Co., Mansfield, O.

SWITCHES, Remote Control

Push Button, Magnetically Operated.
Adam Electric Co., Frank, St. Louis, Mo.
Allen-Bradley Co., 493 Clinton, Milwaukee, Wis.
Anderson & Co., C. J., 212 W. Austin Ave., Chicago, Ill.
Automatic Switch Co., 154 Grand, New York, N. Y.
Burke Controller Co., 360 Lexington Ave., New York, N. Y.
Clark Controller Co., 1146 E. 152nd, Cleveland, O.
Cramer & Co., R. W., 136 Liberty, New York, N. Y.
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee.
Diamond H. See Hart Mfg. Co.
Dunco. See Struthers Dunn, Inc.
Electric Valve Mfg. Co., 64 Murray, New York, N. Y.
General Electric Co., Merchandise Dept., Bridgeport, Conn.
Hart Mfg. Co., Hartford, Conn.
H P See Palmer Elec & Mfg. Co.
Industrial Controller Div. of Square Co., S. Pierce & Hanover Sts., Milwaukee, Wis.
Kato Engr. Co., Mankato, Minn.
Lincoln Elec. Co., Colt Rd. & Kirby Ave., Cleveland, O.
Major, F. A., System. See Adam Elec. Co.
Monitor Controller Co., 51 S. Gay, Baltimore, Md.
Palmer Elec. & Mfg. Co., Waltham, Mass.
Precise Mfg. Co., 254 Mill, Rochester, N. Y.
Protectoswitch. See Precise Mfg. Co.
R. C. O. C. See South Bend Current Controller Co.
Ross Safety Switch Corp., 1 E. 42nd, New York, N. Y.
Sauter. See Cramer & Co., R. W.
Signal Engineering & Mfg. Co., 146 W. 14th, New York
South Bend Current Controller Co., 247 La Porte, South Bend, Ind.
States Co., 19 New Park Ave., Hartford, Conn
Struthers Dunn, Inc., 138 N. Juniper, Philadelphia, Pa.
Takamine Corp., 208 Rawson St., Long Island City, N. Y.
Teeple Co., L. R., 540 E. Ninth, Portland, Ore.
Triplock. See Monitor Controller Co.
Trumbull Elec. Mfg. Co., Plainville, Conn.
Zenith Elec. Co., 537 S. Dearborn, Chicago, Ill.

SWITCHES, Snap

	KEY
Feed Through	See p
Fixture (Canopy, Candelabra and Key Arm)	See F
Flush	See f
Lever, Toggle, Tumbler	See L
Pendant	See p
Push Button	See P
Rotary	See R
Surface	See s

See Also Switches, Snap; Heavy Duty.
Adam Electric Co., Frank, St. Louis, Mo. f . . . . . .
Anylite Elec. Co., 200 Murray, Ft. Wayne, Ind. . . . . .
Arrow Electric Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn... f sp P R L F
Arrow Head. See Arrow Elec.
Beaver Mfg. Co., 625 N. Third, Newark, N. J. . . . . f p P . . . F
Best. See United States Elec. Mfg. Corp.

Brascolite. See Guth & Co., Edwin.
Bremer Elec. Mfg. Co., 139 N. 7th, Philadelphia, Pa. . . . . f . . . . . .
Bridgeport Switch Co., 209 Center, Bridgeport, Conn. . . . . L F
Bryant Elec. Co., Bridgeport, Conn. . . . . f sp P R L F
B. S. Co. See Bridgeport Switch Co.
Carling Tool && Machine Co., 618 Capitol Ave., Hartford, Conn. . . . . F
Commercial. See Gaynor Electric Co.
Connecticut Elec. Mfg. Co., Bridgeport, Conn. . . . . p P R L F
Crouse-Hinds Co., Syracuse, N. Y. . . . . L . .
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee, Wis. . . . . P . . . L . .
Diamond H. See Hart Mfg. Co.
Dugie. See Bryant Elec. Co.
Gaynor Elec. Co., Stratford, Conn. . . . . f . . . . . L . .
General Elec. Co., Bridgeport, Conn. . . . . f sp P R L F
Glo-Guide. See Bryant Elec. Co.
Gold Star Push Switch. See Hart & Hegeman.
Guth & Co., Edwin, 2625 Washington Ave., St. Louis, Mo. . . . . F
Hart Mfg. Co., Hartford, Conn. . . . . f sp P R L
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co. (Door Bolt Control) f sp P R L F
Hart. See Hart & Hegeman.
H. & H. See Hart & Hegeman Mfg. Co.
Hubbell, Inc., Harvey, Bridgeport, Conn. . . sp . . . . L F
Jost. See Morse, Frank W.
Keil & Son, Francis, 401 E. 163rd, New York, N. Y. . . . . f . . P . . . . .
Leviton Mfg. Co., 226 Newell, Brooklyn . . . . . F
Levolier. See McGill Mfg. Co.
McGill Mfg. Co., Valparaiso, Ind. . . . . f . . . . . L F
Marks Products Co., 80 N. Ninth, Brooklyn, N. Y. . . . . L F
Metropolitan Elec. Mfg. Co., Blvd at 14th St., Long Island City, N. Y. . . . . s . . B . . .
Morse Co., Frank W., 291 Congress, Boston . . . P . . . . .
National. See Standard Elec. Mfg. Co.
New England. See Paulding, John L.
Nutmeg. See Hubbell, Harvey, Inc.
Operite. See Morse Co., Frank W.
Pass & Seymour, Solvay Sta., Syracuse, N. Y. . . . . f sp P . . L F
Paulding, John L, New Bedford, Mass. . . . f s P . . . . .
Pen Tap. See Beaver Mfg. Co.
Perkins. See Bryant Elec. Co.
Pilot Radio & Tube Corp., 323 Berry, Brooklyn, N. Y. . . . . L . .
Pilotoggle. See Pilot Radio & Tube Corp.
Pilotoggle. See Pilot Elec. Mfg. Co.
Pulirite. See Morse, Frank W.
Rodale Mfg. Co., 200 Hudson, New York p . . . . . .
Sears, Henry D., 80 Boylston, Boston.. f sp P R L F
Smith & Co., T. C., 2915 Powelton Ave., Philadelphia, Pa. . . . . P . . . . .
Snapit. See Marks Products Co.
Spartan. See Bryant Elec. Co.
Standard Elec. Mfg. Co., 941 Wrightwood Ave., Chicago, Ill. . . . . f s P R L . .
Trigle. See Bryant Elec. Co.
Tumbolier. See Hart & Hegeman.
Twi-Lite. See McGill Mfg. Co.
United States Elec. Mfg. Corp., 222 W. 114th, New York, N. Y. . . . . f . . . . . .
Victor. See Keil & Son, Francis.
Washington. See Gaynor Electric Co.
Weber. See Sears, Henry D.
Werkrite. See Morse, Frank W.
Yankee. See Bryant Elec. Co.

SWITCHES, Snap; Heavy Duty

Heavy duty rotary snap switches for Electric Range and Small Motor Control.
Arrow Elec. Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.
Bryant Electric Co., 1421 State, Bridgeport, Conn.
Diamond H. See Hart Mfg. Co.
Domestic Electric Co., Kent, O.
General Electric Co., Section W-234, Merchandise Dept., Bridgeport, Conn.
Hart Mfg. Co., Hartford, Conn.
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.

SWITCHES, Storage Battery; Automatic Disconnecting

Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee
Penn Electric Switch Co., E. 20th & Walnut Sts., Des Moines, Ia.
Radioloc. See Cutler-Hammer Mfg. Co.

SWITCHES, Tank

Anderson & Co., C. J., 212 W. Austin Ave., Chicago, Ill
Blackburn-Smith Corp., 25 W. 45th, New York, N. Y.
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee.
General Electric Co., Schenectady, N. Y.
Industrial Controller Div. of Square Co., S. Pierce & Hanover Sts., Milwaukee, Wis.
Leader-Trahern Products Co., Decatur, Ill.
Ostrander Elec. Wks., W. R., 911 Atlantic Ave., Brooklyn.
Penn Elec. Switch Co., 20th & Walnut, Des Moines, Ia
Roberts & Kanze Elecl. Repair Co., 240 W. 25th, New York.
Sundh Elec. Co., 209 Parkhurst, Newark, N. J.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

SWITCHES, Time (Automatic Clock Operated Switches)

Anderson Mfg. Co., Albert & J. M., 289 A, Boston, Mass.
Astrachron. See Gem Engineering Co.
Automatic Elec. Mfg. Co., Mankato, Minn.
Automatic Lighting Co., 831 Greenmount Ave., Baltimore.
Berry, A. Hall, 73 Murray, New York, N. Y.
Brown & Pengilly, Inc., 1284 Folsom, San Francisco, Cal.
Buckeye Time Switches, Inc., 1557 St. Clair Ave., Cleveland, O.
Cackle. See Berry A. Hall.
Campbell Electric Mfg. Co., 15 Stewart, Lynn, Mass.
Cramer & Co., R. W., 136 Liberty, New York, N. Y.
Electric Steam Radiator Co., 513 Stewart, Seattle, Wash
Eureka Tool & Machine Co., 42 Walnut, Newark, N. J.
Frisch, Walter P., 104 Linden, Rochester, N. Y.
Gem Engineering Co., Hempstead, N. Y.
General Electric Co., Schenectady, N. Y.
Go-N-Set. See G. & S. Research Lab.
G. & S. Research Laboratory, 1269 Cochran Ave., Los Angeles, Cal.
Hart Mfg. Co., Hartford, Conn.
Hartford. See Berry A. Hall.
Horni Signal Mfg. Co., 290 Hudson, New York, N. Y.
Horolectrical Corp., 216 W. 14th, New York, N. Y.
Jewel. See Time Switch Sales & Service.
Kwizset. See Thompson Clock Co.
Lamp-Lighter. See Robbins & Myers Co.
Liberty Bell Mfg. Co., Minerva, Ohio.
Mercury Time Switch Co., Marine City, Mich
Northwestern Clock Co., 515 Brown Bldg., Omaha, Neb.

Announcing the
RUBICON COIL TESTER

An entirely new instrument for detecting short-circuited turns and defective insulation in coils and windings.

If you make or use coils for any purpose whatever—you need a RUBICON COIL TESTER.

Described in Bulletin 1090, a copy of which will be sent upon request.

RUBICON COMPANY
Makers of Precision Electrical Instruments
29 North 6th Street, Philadelphia, Pa.

for you!

N. E. L. A.

We offer this new, complete, DUNCO catalog of information and engineering data on Relays, Remote Control Switches, Mercury Switches, Thermostats, etc., as our contribution toward solving current control problems. Your copy mailed immediately on request.

STRUTHERS DUNN, INC.
138 N. Juniper St. SD Philadelphia, Pa.

NATIONAL-HARRIS
WIRES
FOR EVERY PURPOSE

Whether the application be standard or special, NATIONAL-HARRIS is in an advantageous position to give immediate attention to the order.

Not only in resistance wires but in nickel tubing, filament wire and, there is no known fine wire or alloy that we cannot make.

PRODUCTS

Resistance Wires and Ribbons for Electrical Heating Purposes

Cromic "A," Cromic "C," Cromic "D," Novar

RADIO TUBE PRODUCTS

Filament Ribbons, Strip for Plates, Seamless Tubing, Support Wire, Wire for Mesh

Other Alloys Furnished in the Form of Wire, Ribbon and Strip

NATIONAL-HARRIS WIRE CO.
with which is consolidated the Standard Alloy Wire Co.
PLANTS AND GENERAL OFFICES
NEWARK, N. J.

WESTERN PLANT
1215 Washington Blvd., Chicago

1. Air Heaters
2. Automatic Motor Starters.
3. D. C. Battery Charging Equipment.
4. Field Rheostats.
5. Laboratory Resistors and Rheostats.
6. Motor Starters and Controllers A. C. and D. C.
7. Radio Resistors and Rheostats.
8. Resistors for all purposes.
9. Rheostats for all purposes.
10. Speed Controllers.
11. Theatre Dimmers.

WARD LEONARD ELECTRIC CO.
31-41 South St. Mount Vernon, N. Y.

SWITCHES, Time—Continued
Paragon Elec. Co., 407 S. Dearborn, Chicago, Ill.
Racine. See Reliance Automatic Ltg. Co.
Radio Owl, 2269 E. 51st, Los Angeles, Cal.
Radio Switchman. See R-V Mfg. Co.
Reliance Automatic Ltg. Co., 1925 Meade, Racine, Wis.
Research Mfg. Laboratory, 1269 Cochran Ave., Los Angeles
Robbins & Myers Co., Springfield, O.
Ross Safety Switch Corp., 1 E. 42nd, New York, N. Y.
R-V Mfg. Co., Marshfield, Mass.
Sauter. See Cramer & Co.
Sentinel. See Electric Steam Radiator Co.
Stat-Amatic Instrument & Appliance Co., Hartford, Conn.
States Co., Hartford, Conn.
Stromberg Electric Co., 223 W. Erie, Chicago, Ill.
Thompson Clock Co., H. C., Bristol, Conn.
Time Switch Sales & Service, 1841 Euclid Ave., Cleveland.
Tork Clocks, Inc., 12 E. 41st, New York, N. Y.
Walser Automatic Timer Co., 405 Lexington Ave., New York. (Also Coin Operated.)
X-L Radio Laboratories, 1224 Belmont Ave., Chicago, Ill. (Timer.)
Zenith Elec. Co., 537 S. Dearborn, Chicago, Ill.

TACHOMETERS

Speed Indicators, Speedometers, Revolution Counters.
Biddle, James G., 1309 Arch, Philadelphia, Pa.
Brown Instrument Co., Wayne & Windrim, Philadelphia.
Comet Elec. Co., 47 Union Trust Bldg., Indianapolis, Ind.
Durant Mfg. Co., 655 Buffum, Milwaukee, Wis.
Electric Tachometer Corp., Spring Garden & Broad St., Philadelphia, Pa.
Holtzer-Cabot Elec. Co., Boston, Mass.
Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia, Pa.
Misener Mfg. Co., 826 E. Washington, Syracuse, N. Y.
Productimeter. See Durant Mfg. Co.
Standico. See Sticht & Co.
States Co., 19 New Park Ave., Hartford, Conn.
Sticht & Co., H. H., 13 Park Row, New York, N. Y.
Veeder Mfg. Co., 14 Sargeant, Hartford, Conn.
Weston Elect. Instrument Co., 582 Frelinghuysen Ave., Newark, N. J.
Zernickow Co., O., 15 Park Row, New York, N. Y.

TAGS, Cable; Pole and Battery

American Radio Hardware Co., 135 Grand, New York, N. Y. (Battery Lead Tags.)
Benedict Mfg. Co., East Syracuse, N. Y.
Brecklin Underground Elec'l Mfg. Co., Glenside, Pa.
Crowe Name Plate & Mfg. Co., 1749 Grace, Chicago, Ill.
Grammes & Sons, Inc., L. F., Allentown, Pa.
International Tag Co., 319 N. Whipple, Chicago, Ill.
Matthews & Co., Jas. H., 3942 Forbes, Pittsburgh, Pa.
Premax Products, Inc., 230 Tenth, Niagara Falls, N. Y.
Viking Tool & Machine Co., 745 65th, Brooklyn, N. Y.
Waterbury Button Co. (Elect. Mfg. Dept.), Waterbury Conn.

TAGS, Shipping

Campbell Paper Box Co., 904 S. Main, South Bend, Ind.
International Tag Co., 319 W. Whipple, Chicago, Ill.
TAMPING TOOLS, COIL. See Tools, Commutator Truing.
TANK SWITCHES. See Switches, Tank.
TANKS, TINNING. See Wire Manufacturing Machines

TANTALUM

Fansteel Products Co., Inc., North Chicago, Ill.

TAPE, Asbestos

American Asbestos Co., Norristown, Pa.
Asbestos Fibre Spinning Co., North Wales, Pa.
Ferodo & Asbestos, Inc., New Brunswick, N. J.
General Asbestos & Rubber Co., Charleston, S. C.
Johns-Manville Corp., New York, N. Y.
Matthews & Co., Jas. H., 3942 Forbes, Pittsburgh, Pa.
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
Niagrite. See Johns-Manville, Inc.
Shield Brand. See Mitchell-Rand Mfg. Co.

TAPE, Cotton, Linen, Silk; Tape, Sleeving, Webbing.

Alfalfa. See Burrell Belting Co.
Anchor Webbing Co., 300 Brook, Pawtucket, R. I. (Cotton, Silk).
Awabco. See Anchor Webbing Co.
Bermaline. See Burrell Belting Co.
Burrell Belting Co., 413 S. Hermitage Ave., Chicago, Ill.
Eagle. See Sidebotham, Inc., John.
General Electric Co., Schenectady, N. Y.
Gilmer Co., L. H., Cottman & Keystone Sts. (Tacony) Philadelphia, Pa.
Hope Webbing Co., 1005 Main, Providence, R. I.
Krout & Fite Mfg. Co., Allegheny Ave. & Emerald Philadelphia, Pa.
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
Pearce Co., R. T., Covington, Ky.
Shield Brand. See Mitchell-Rand Mfg. Co.
Sidebotham, Inc., John, 4317 Griscom, Philadelphia, Pa.
Smith Belting Co. (Germantown), Philadelphia, Pa.
Superfine. See Windsor Webbing Co.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Windsor Webbing Co., Pawtucket, R. I.
Worcester Braiding Co., 34 Southbridge, Worcester, Mass.

TAPE, Mica

Chicago Mica Co., 345 Campbell, Valparaiso, Ind.
Mica Insulator Co., 200 Varick, New York, N. Y.
Mica Mfg. Co., 135 Johnson, Brooklyn, N. Y.
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

TAPE, Rubber and Friction

Ackerman. See Ackurate Rubber Co.
Ackurate Rubber Co., 25 Beaver St., New York, N. Y.
Adamson & Co., Joseph, Columbia and Germantown Aves., Philadelphia, Pa.
Adhere. See Westinghouse Elec. & Mfg. Co.
Alpha. See Johns-Manville, Inc.
Amazon. See Graybar Elec. Co.
Appleton Rubber Co., Franklin, Mass.
Black Diamond. See Dunton Co., M. W.
Boston Woven Hose & Rubber Co., Boston, Mass.
Brooklyn. See Johns-Manville, Inc.

Bull-Dog. See Boston Woven Hose & Rubber Co.
Candee. See Ackurate Rubber Co.
Canfield Rubber Co., Bridgeport, Conn.
Canton. See Plymouth Rubber Co.
Clifton. See Clifton Mfg. Co.
Clifton Mfg. Co., 65 Brookside Ave., Boston 30, Mass.
Competition. See New York Insulated Wire Co.
Double-Wear. See Dryden Rubber Co.
Consumers Rubber Co., 1302 Ontario, N., Cleveland, O.
Coruco. See Consumers Rubber Co.
Criterion. See Consumers Rubber Co.
Dryden Rubber Co., 1014 S. Kildare Ave., Chicago, Ill.
Dundee, A. & B. See Okonite Co.
Dunton Co., M. W., 870 Eddy St., Providence, R. I.
Dutch-Brand. See Van Cleef Bros.
Elkhart Rubber Wks., Elkhart, Ind.
Firestone Tire & Rubber Co., Akron, O.
General Electric Co., Merchandise Dept., Bridgeport, Conn.
Graybar Elec. Co., Graybar Bldg., Lexington Ave. & 43rd St., New York, N. Y.
Grimshaw. See New York Insulated Wire Co.
Grimtite. See Canfield Rubber Co.
Holfast Rubber Co., Atlanta, Ga.
Holdtite. See United States Rubber Co.
Hydro-Proof. See Elkhart Rubber Wks.
Imperial Rubber Co., 220 Broadway, New York, N. Y.
Impervo. See Canfield Rubber Co.
Ireco. See Imperial Rubber Co.
Johnson & Johnson, New Brunswick, N. J.
Johns-Manville Corp., New York, N. Y.
Jomanco. See Johns-Manville, Inc.
Jonflex. See Johnson & Johnson.
Kerite Ins. Wire & Cable Co., 30 Church, New York, N. Y.
Manson. See Okonite Co.
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
New York Insulated Wire Co., 114 Liberty, New York, N. Y.
Noxall. See Consumers Rubber Co.
Okonite Co., Passaic, N. J.
O. K. See Appleton Rubber Co.
P. & B. See Ruberoid Co.
Paratex. See Appleton Rubber Co.
Paruco. See Passaic Rubber Co.
Passaic Rubber Co., Clifton, N. J.
Plymouth Rubber Co., 1400 Revere, Canton, Mass.
Red-X. See Louis Rubber Cement Co.
Relto. See United States Rubber Co.
Ruberoid Co., 95 Madison Ave., New York, N. Y.
Silco. See Superior Insulation Tape Co.
Slipknot. See Plymouth Rubber Co.
Star. See Sullivan & Sons Mfg. Co., J.
Sticka. See Graybar Elec. Co.
Stixwell. See Clifton Mfg. Co.
Sullivan & Sons Mfg. Co., J., 2224 N. 9th, Philadelphia, Pa.
Superior Insulating Tape Co., 3044 Lambain Ave., St. Louis.
2-Plex. See Holfast Rubber Co.
U. S. See United States Rubber Co.
United States Rubber Co., 1790 Broadway, New York, N. Y.
Usco. See United States Rubber Co.
Van Cleef Bros., 7722 Woodlawn Ave., Chicago.
Victor. See Graybar Elec. Co.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa

TAPE, Varnished Fabric

Acme Wire Co., New Haven, Conn.
General Electric Co., Merchandise Dept., Bridgeport, Conn.
Irvington Varnish & Insulator Co., Irvington, N. J.
Irv-O-Plastene. See Irvington Varnish & Insulator Co.
Mica Insulator Co., 200 Varick, New York, N. Y.
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
New Jersey Wood Finishing Co., Woodbridge, N. J.
Radiotape. See Respro, Inc.
Respro, Inc., Wellington Ave. (Auburn), Providence, R. I.
Shield Brand. See Mitchell-Rand Mfg. Co.
Sico. See Standard Insulator Co.
Standard Insulation Co., East Rutherford, N. J.
Voltape. See Respro, Inc.

TAPING MACHINES, Coil

Chapman Electric Works, P. E., 1820 Chouteau Ave., St. Louis, Mo.
Columbia Machine Works & Malleable Iron Co., Atlantic Ave. and Chestnut St., Brooklyn, N. Y.
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
Griswold Machine Co., George, New Haven, Conn.
Ridion Company, Frank, Boston, Mass.
Secur. See Electric Service Supplies Co.
Seifert, E. R., 315 E. Washington, Syracuse, N. Y. (Automatic.)

TAPING MACHINES, Wire

American Insulating Machinery Co., 519 Huntington Ave., Philadelphia, Pa.
Wire Machinery Corp. of Am., New Haven, Conn.
TAPS. See Stocks, Dies and Reamers.
TENSION DEVICES, Coil Wire. See Racks, Wire Reel

TENSION MACHINES, Band Wire

Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
Peerless. See Electric Service Supplies Co.

TERMINALS AND CONNECTORS

Low Tension, Secondary Terminals and Connectors.
All-in-One. See Ohio Parts Co.
Barcy-Nicholson Co., 2801 Fort, W., Detroit, Mich.
Bassett Metal Goods Co., Derby, Conn. (General Selling Agent, Hatheway & Co., 16 Hudson, New York, N. Y.)
Burton-Rogers Co., Boston, Mass.
Cabelug. See Jones, Howard B.
Clark Metal Products, 490 Hancock Ave., Bridgeport.
Dixie Supply Co., 91 7th Ave., New York.
Double Grip. See Pons, Eugene
Eagle Elec. Mfg. Co., 59 Hall, Brooklyn, N. Y.
Electron. See Bassett Metal Goods Co.
Fahnestock Elec. Co., East Ave. and 8th, Long Island City, N. Y.
Grammes & Sons, Inc., L. F., Allentown, Pa.
Ideal Clamp Mfg. Co., 958 Bradford, Brooklyn, N. Y.
Jones, Howard B., 2300 Wabansia Ave., Chicago, Ill.
K. E. M. See Kulier Elec. Mfg. Co.
Kulier Elec. Mfg. Co., 575 Pierce Ave., Long Island City
Morse Co., Frank W., Boston, Mass.
Nu-Way Snap. See Hatheway Mfg. Co.
Ohio Parts Co., 3301 Colerain Ave., Cincinnati, O.
Orum, S. R. M., 503 N. 11th, Philadelphia, Pa.
Patton-MacGuyer Co., Providence, R. I.
Pons, Eugene, 927 Campbell Ave., Schenectady, N. Y.
Pedrason Co., 7 Beverly, Providence, R. I.
Rajah Co., Bloomfield, N. J.
Salem Elec'l Supply Co., Salem, Mass.
Sherman Mfg. Co., H. B., Battle Creek, Mich.

THERMOSTATIC METAL
For Low and High Temperatures
Our No. 1800 metal for temperatures up to 450° F.
Our No. 2800 metal for temperatures up to 1500° F.
W. M. CHACE VALVE COMPANY
1600 Beard Avenue, Detroit, Mich.

PENN-UNION TERMINAL BLOCKS
in new and improved designs are space savers yet have ample room for making connection. Write for special bulletin.
PENN-UNION ELECTRIC CORP.
ERIE, PA.

Shure. See Burton-Rogers Co.
Tinkerbox. See Weber Elec. Wks.
Waterbury Button Co. (Elect. Mfg. Dept.), Watebury, Conn.
Weber Elec. Wks., Brooklyn Sta., Cleveland, O.
Wolverine Tube Co., 1431 Central Ave., Detroit, Mich.
Zierick Machine Wks., F. R., 6 Howard, New York.

TERMINAL BLOCKS

Penn Union Elec. Corp., Erie, Pa.

TEST BENCHES, Armature

Allen Electric & Equipment Co., Kalamazoo, Michigan.
Burton & Rogers Co., Boston, Mass.
Cowie Electric Co., E. S., 1823 Wyandotte, Kansas City, Mo.
Hobart Bros. Co., Troy, Ohio.
Marshall Elec. Co., Elkhart, Ind.
Milno Company, 717 Sycamore, Cincinnati, Ohio.
North East Appliance Corp., 379 Lyell Ave., Rochester, N. Y.
Pence & Son, H. O., San Luis Obispo Cal
Weidenhoff, Joseph, 4352 Roosevelt Road, Chicago, Ill.
TESTING INSTRUMENTS. See Instruments

TESTERS, Coil

(Includes Armature Growlers, trouble shooters, and other portable testing devices). See also Instruments
Arc. See Weidenhoff, Joseph.
Allen-Bradley Co., 493 Clinton, Milwaukee, Wis.
Allen Electric & Equipment Co., Kalamazoo, Michigan
Ankenbrandt, J. J., 2140 Wakeman, Toledo, Ohio.
Armeter. See Chapman Electric Works, P. E.
Burton & Rogers Co., 857 Boylston, Boston, Mass
Century Electrical Co., 100 Randall Ave., Syracuse, N. Y.
Chapman Elec'l Works, P. E., 1820 Chouteau Ave., St. Louis, Mo
Cleveland Steel Products Corp., 7306 Madison Ave., Cleveland, O.
Coipin Corp., 6110 S. Main, Los Angeles, Cal.
Columbia. See Weidenhoff, Joseph.
Comparometer Co., New Ulm, Minn.
Cowie Electric Co., E. S., 1823 Wyandotte, Kansas City, Mo.
Economy. See Weidenhoff, Joseph.
Electric Controller & Mfg. Co., 2700 E. 79th, Cleveland.
Electrotest. See Comparometer Company.
Ev-Ri-Test. See Weidenhoff, Joseph.
Ga-Jit. See General Instrument Corp.
General Instrument Corp., 225 Varick, New York, N. Y.
Herald Elec. Co., 29 East End Ave., New York, N. Y.
Hobart Bros. Co., Troy, Ohio.
Ideal. See Ankenbrandt, J. J.
Indiana Mfg. & Electric Co., Marion, Indiana.
Kietzman Electrical Mfg. Co., 234 N. Central, Gilman, Ill.
Leich Electric Co., Genoa, Ill.
Lundin Electric Machine Co., 10 Thacher, Boston, Mass.
Mallory Electric Co., Factories Bldg., Toledo, Ohio.
Marshall Elec. Co., Elkhart, Ind.
Milno Company, 717 Sycamore, Cincinnati, Ohio.
North East Appliance Corp., 379 Lyell Ave., Rochester, N. Y.
Onan, David W., 43 Royalstone Ave., Minneapolis, Minn.
Paneltest. See Allen Elec. & Equip. Co.
Portometer. See Allen Elec. & Equip. Co.
Portostat. See Allen Elec. & Equip. Co.
Presto. See Metal Specialties Mfg. Co.
Res Batrvstat See Hartlett Products Co
Rubicon Co., 29 N. Sixth, Philadelphia, Pa.
Scout. See Leich Electric Company
States Co., 19 New Park Ave., Hartford, Conn. (Transformer Test Table)
Test-All. See Coipin Corp.
Test-O-Meter. See Weidenhoff, Joseph.
Test-Rite. See Coipin Corp.
Victory. See Weidenhoff, Joseph
Weidenhoff, Joseph, 4352 Roosevelt Road, Chicago, Ill.

TESTING LABORATORIES

Baker & Co., Inc., 54 Austin, Newark, N. J.
Elec'l Testing Laboratories, 80th St. and East End Ave., New York, N. Y.
National Elec'l Inst. Co., 162 Sidney, Cambridge, Mass.
New York Testing Laboratories, 80 Washington, New York.
Rubicon Co., 29 N. Sixth, Philadelphia, Pa.
THERMO JUNCTIONS. See Instruments, Laboratory Standard.

THERMOSTATIC METAL

Baker & Co., Inc., 54 Austin, Newark, N. J.
Chace Valve Co., W. M., 1608 Beard Ave., Detroit, Mich.
Coffin Mfg. Co., B. F., 30 Court, Newark, N. J.
Cook Plate Co., Edw. N., 70 Ship, Providence, R. I.
General Plate Co., Attleboro, Mass.
Improved Seamless Wire Co., 775 Eddy, Providence, R. I.
Interstate Products Corp., 503 Mulberry, Newark, N. J.
National-Harris Wire Co., Newark, N. J.
Venbur. See Coffin Mfg. Co., B. F.
Wilco. See H. A. Wilson Co
Wilson Co., H. A., Newark, N. J.

THERMOSTATS

Airswitch. See Time-O-Stat Controls Co.
American Thermostat Co., 226 Jelliff Ave., Newark, N. J.
Automatic Appliance Co., Jackson, Mich.
Bak-Rite. See Electric Appliance Mfg. Co.
Bisiop & Babcock Sales Co., 4901 Hamilton Ave., N. E., Cleveland, O.
Boston Machine Wks. Co., 7 Willow, Lynn, Mass.
Brown. See Electric Automatic Appliance Co.
Brown Instrument Co., Wayne & Windrim, Philadelphia, Pa.
Burke Controller Co., 369 Lexington Ave., New York, N. Y.
Cobb Elec. Appliance Co., 100 Massachusetts Ave., Boston.
Coffin Mfg. Co., B. F., 30 Court, Newark, N. J.
Diamond H. See Hart Mfg. Co.
Dunco. See Struthers Dunn, Inc.
Electric Automatic Appliance Co., Denver, Colo.
Electric Heat Control Co., 5902 Carnegie Ave., Cleveland, O.
Electric Maid. See Hankscraft Co.
Fabrice Thermostatic Control Co., 4750 Sheridan Rd., Chicago, Ill.
Freas Thermo-Electric Co., 1206 S. Grove, Irvington, N. J.
Globe Mfg. Co., Battle Creek, Mich.
Hankscraft Co., 615 E. Washington, Madison, Wis.

Approved . . . and . . . the Best

ILSCO Copper Lugs are approved by Underwriters' Laboratories—and the best because they are made as accurately as humanly possible from the finest electrolytic copper tubing.

Tubing is made in our own plant, thoroughly cleaned ready for soldering, flat surface contacts, amperage clearly marked on every lug, and are burnished to a bright finish with barrel end of lug even for tight fitting.

ILSCO Copper Lugs are guaranteed in every respect.

Quotations and samples on request.
ILSCO COPPER TUBE & PRODUCTS, INC.
5629 Madison Road, Cincinnati, Ohio

Show Window Cord Lamp Cord
LOWELL INSULATED WIRE CO.
Lowell, Mass.
N. E. C. S. Wire Telephone Wire

Make use of GAGE STENCILS

Gage Stencils are corrected daily, and the names of *all* your electrical buyers are on them. Use them for reliable, complete coverage.

THE GAGE PUBLISHING CO., INC.
461 Eighth Avenue, New York, N. Y.

Coiled Springs

Flat Springs

Small Stampings

in any quantity

of any material

for the
Electrical Manufacturer

May we figure on your needs?

THE WALLACE BARNES CO.
BRISTOL, CONNECTICUT

Barnes made
COLD ROLLED SPRING STEEL
SPRING WASHERS ASSEMBLIES
SCREW MACHINE PARTS
SMALL STAMPINGS
SPRINGS

THERMOSTATS—Continued
Hart Mfg. Co., Hartford, Conn.
Hi-Lo. See Boston Machine Wks. Co.
Hynes & Cox Elec. Corp., 406 N. Pearl, Albany, N. Y.
Interstate Products Corp., 29 Commercial, Newark, N. J.
King. See Electric Heat Control Co.
Klixon. See Westinghouse Electric & Mfg. Co.
Marvel. See American Thermostat Co.
Mercoid Corp., 564 W. Adams, Chicago, Ill.
Moeller, A. E., 261 Sumpter, Brooklyn, N. Y.
National Steel Construction Co., 425 Fountenac, Seattle, Wash.
Pyratherm. See Federal Gauge Co.
Safety Regulator Co., 529 S. Mathews, Los Angeles, Cal.
Savutime Devices, Inc., 88 Manhattan, Rochester, N. Y.
Stat-Amatic Instrument & Appliance Co., Hartford, Conn.
Struthers Dunn, Inc., 138 N. Juniper, Philadelphia, Pa.
Tagliabue Mfg. Co., C. J., 18 33rd, Brooklyn, N. Y. mediate Voltage.
Teeple Co., L. R., 340 E. 9th, Portland, Ore.
Thermoelectric. See Bishop & Babcock Sales Co.
Time-O-Stat Controls Co., Elkhart, Ind.
Trent Co., Harold E., 429 N. 12th, Philadelphia, Pa.
Visaflame. See Mercoid Corp.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Wilcolator Co., Newark, N. J.

TIGHTENERS, Commutator

Elmes Engineering Works, Chas. F., 230 N. Morgan, Chicago, Ill.

TIME SWITCHES. See Switches, Time.

TIN FOIL

Lehmaier, Schwartz & Co., 521 W. 25th, New York, N. Y.
United States Foil Co., 30th & Grand Sts., Louisville, Ky.

TINNING TANKS, WIRE. See Wire Manufacturing Machines.

TINSEL. See Wire, Insulated.

TINSEL, Cord and Thread

Belden Mfg. Co., 4631 W. Van Buren, Chicago, Ill.
Diamond Braiding Mills, Chicago Heights, Chicago, Ill.
Empire Notion Co., 335 W. 35th, New York, N. Y.
Frank & Co., M. J., 15 W. 39th St., New York, N. Y.
General Electric Co., Merchandise Dept., Bridgeport, Conn.
Hy-Sil Mfg. Co., Revere, Mass.
Kilo Co., 2 E. 23rd, New York, N. Y.
Koelle, Frederick C., Real Estate Trust Bldg., Philadelphia.
Lees Mfg. Co., 320 Broadway, New York, N. Y.
Montgomery Co., J. R., Windsor Locks, Conn.
Rockbestos Products Corp., 389 Nicoll, New Haven, Conn.
Springfield Wire & Tinsel Co., Springfield, Mass.

TIPS, Cord

Duro. See McEvoy, C. H.
McEvoy, C. H., 430 Broadway, Lowell, Mass.
National Acme Mfg. Co., 7500 Stanton Ave., Cleveland, O.
Norden & Co., S. 180 S. Water, Providence, R. I.
Rome Wire Co., Div. of General Cable Corp., Rome, N. Y.
Waterbury Brass Goods Corp., Waterbury, Conn.

TOOLS, Commutator Slotting. See Slotting Machines & Tools, Commutator.

TOOLS, Coil Tamping

Ideal Commutator Dresser Co., 1039 Park Ave., Sycamore, Ill.

TOOLS, Commutator Truing

Acme. See Green Equipment Corp.
Allen Elec. & Equipment Co., Kalamazoo, Mich.
Binghamton Flexible Shaft Co., Binghamton, N. Y.
Central Mfg. Co., Fairfield, Ia.
Green Equipment Corp., 260 Monadnock Block, Chicago, Ill.
Ideal Commutator Dresser Co., 1039 Park Ave., Sycamore, Ill.
Imperial. See Martindale Elec. Co.
Jordan Bros., 74 Beekman, New York, N. Y.
Martindale Elec. Co., 1262 W. Fourth, Cleveland, Ohio.

TOOLS, Storage Battery

Battery Equipment & Supply Co., 7530 Greenwood Ave., Chicago, Ill. Burning Racks, Battery Trucks Plate Pressers, Mallets, Lead Burners, Strainers and Racks.
Battery Parts Co., Inc., Wilkinsburg, Pa. (Leads.)
Battery Tools Co., 29 Willow, Montclair, N. J.
Beese. See Battery Equipment & Supply Co.
Bobbett Elec. Mfg. Co., 4307 Cottage Grove Ave., Chicago, Ill. (Knife Heaters.)
Canedy-Otto Mfg. Co., 1816 McGee, Chicago Heights, Ill. (Floor Vises.)
Cleveland Steel Products Corp., 7306 Madison Ave., Cleveland, O. (Steamer and Still, Filler, Separator Cutter, Clips, Carrier, Post Cutter, Terminal and Cell Puller.)
General Elec. Co., Schenectady. (Lead Burning Outfits.)
Heet-A-Knife. See Bobbett Elec. Mfg. Co.
Ohio Parts Co., 3561 Colerain Ave. Cincinnati (Terminals)
Op-Al Elec. & Mfg. Co., 1057 E. 30th St., Indianapolis, Ind. (Knife Heaters.)
Orum, S. R. M., 503 N. 11th, Philadelphia, Pa. (Pillar Post Sleeves, Tongs, Reamers, Strap Punches, Terminal Pullers, Steamers, Racks or Stands, Terminal Post Shapers, Battery Analyzer, Post Sealing Machine, Plate Burning Press, Press and Stands.)
Pyratip. See General Elec. Co.
Thompson Mfg. Co., Meadville, Pa. (Reamers, Terminal Post Pullers, Pressing Tongs.)

TORCHES AND FURNACES

Acetylene, Alcohol, Gasoline, Kerosene.
Always Reliable. See Otto Bernz Co.
Bernz Co., Otto, Newark, N. J.
Clayton & Lambert Mfg. Co., 6282 Beaubien, Detroit, Mich.
Dreadnaught. See Wall Mfg. Supply Co.
Klein & Sons, Mathias, Chicago, Ill.
Lasher-Weeber Co., 261 Franklin, Boston, Mass.
McGill Mfg. Co., Valparaiso, Ind.
Staysalite. See Klein & Sons, Mathias.

TORPEDO Cord. See Twine.

TORSION BALANCES. See Instruments, Laboratory Standard

TRANSFORMERS

Radio. See Radio Circuit Components.
Gas Tube Sign. See Transformers, Oil Burner.
Oil Burner Ignition. See Transformers, Low & Inter-

TRANSFORMERS, Low and Intermediate Voltage

For Oil Burners, Gas Tube Signs, and other special purposes.
American Bosch Magneto Corp., Springfield, Mass.
American Transformer Co., 178 Emmet, Newark, N. J.
Campbell Elec. Mfg. Co., Lynn, Mass.
Concourse Electric Co., 294 E. 137th, New York, N. Y.
Dongan Elec. Mfg. Co., 2985 Franklin, Detroit, Mich.

COILS
RADIO RELAY INDUCTANCE
MAGNET CLOCKS MEDICAL
TRANSFORMERS
To Your Specification 25 Watt to 5 K.V.A.
Have Us Quote You on Your Particular Requirements
Power Transformer Co., 145 W. 22nd St., New York

Eisler Electric Corp., 770 S. 13th St., Newark, N. J.
Forjos. See Motorless D. C. Neon Sign Co.
General Electric Co. (Merchandise Dept.), Bridgeport, Conn.
Jefferson Electric Co., 1500 S. Laflin, Chicago, Ill.
K-W Ignition Corp., 2811 Chester Ave., Cleveland, Ohio.
Motorless D. C. Neon Sign Co., 100 E. 123rd, New York. (Neon.)
Palmers Corp., Chas., 786 Broad, Newark, N. J.
Power Transformer Co., 145 W. 22nd, New York, N. Y.
Sorgel Electric Co., 89 W. Water, Milwaukee Wis.
Standard Transformer Co., Dana Ave., Warren, O.
Uptigraff Mfg. Co., R. E., First National Bank Bldg., Pittsburgh, Pa.
Ward Leonard Elec. Co., Mt. Vernon, N. Y.
Webster Electric Co., Racine, Wis.

TRANSMISSION DRIVES. See Chain, Transmission.

TRANSMITTERS, Power

Controller drive giving a variety of speeds for use in connection with coil taping machines.
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
Segur. See Electric Service Supplies Co.

TROUBLE FINDERS. See Instruments, Portable and Switchboard; also Testers, Coil.

TRUCKS, Armature. See Lifts, Armature.

TRUCKS, Factory Steel

Angle Steel Stool Co., Plainwell, Mich.

TRUING Devices, Commutator. See Tools, Commutator.

TUBE (Tubes) (Tubing) Adapters. See Radio Receiver Parts.
Aluminum. See Aluminum.
Brass. See Tubing, Brass.
Condenser. See Tubing, Brass and Copper.
Copper. See Tubing, Brass.
Cutters. See Stocks, Dies, etc.
Fibre. See Fibre.
Fibre Candle. See Candles.
Mica. See Mica.
Nickel. See Tubing, Brass & Copper.
Paper. See Tubes, Paper.
Platinum. See Platinum.
Porcelain. See Porcelain.
Pyrometer. See Cores, Resistance.
Refractory. See Cores, Resistance.
Radio. See Radio Vacuum Tubes.
Varnished Fabric. See Tubing, Varnished Fabric.

TUBES, Paper; Cores; Sleeves, Bushings

Cleveland Container Co., 10619 Berea Rd., Cleveland, O.
Climax Tube Co., Mystic, Conn.
Klimaxcore. See Climax Tube Co.
McCausland, J. E., 86 Valley, Providence, R. I.
Pairpoint Corp., New Bedford, Mass.
Paper Tube Co., 1718 N. Damen Ave., Chicago, Ill.
Reliable Elec. Co., 3145 Carroll Ave., Chicago, Ill.
Remington Mfg. Co., 939 Barnum Ave., Bridgeport, Conn.
Standard Underground Cable Co., Div. of General Cable Corp., Pittsburgh, Pa.
Stone Paper Tube Co., Washington, D. C.
Textile Tube Co., Fall River, Mass. (Paper Sleeves.)

TUBING, Brass and Copper

American Brass Co., Waterbury, Conn.
Anaconda. See American Brass Co.
Baltimore Tube Co., 1301 Wicomico, Baltimore, Md.
Bridgeport Brass Co., Bridgeport, Conn.
Bull Dog. See National Elec. Products Corp.
Chase Brass & Copper Co., Waterbury, Conn.
Conklin Brass & Copper Co., T. E., 54 Lafayette, New York
Cook, Dunbar Smith Co., 85 Sprague, Providence, R. I.
Dallas Brass & Copper Co., Div. of Revere Copper & Brass, Inc., 820 Orleans, Chicago, Ill.
French Mfg. Co., 128 Robbins, Waterbury, Conn.
Michigan Copper & Brass Co., Div. of Revere Copper & Brass, 5851 W. Jefferson Ave., Detroit, Mich.
Mueller Brass Co., Port Huron, Mich.
National Copper & Smelting Co., 1395 Coltman Rd., Cleveland, O.
National Elec. Products Corp., Pittsburgh, Pa.
National-Harris Wire Co., Newark, N. J.
Relleum. See Mueller Brass Co.
Roberts Tube Works, 2500 Military Ave., Detroit, Mich.
Rome Brass & Copper Co., Rome, N. Y.
Rome Roller Wire & Tube Co., Div. of Revere Copper & Brass, Inc., Rome, N. Y.
Rome Turney Radiator Co., Rome, N. Y.
Scovill Mfg. Co., Waterbury, Conn.
Standard Underground Cable Co. (Div. of General Cable Corp.), Pittsburgh, Pa.
Summerill Tubing Co., Bridgeport, Pa. (also Nickel)
Torrington Mfg. Co., Torrington, Conn.
Unified Wire & Supply Co., 1497 Elmwood Ave., Providence
Wells Co., A. H., Watertown Ave., Waterbury, Conn.
Wolverine Tube Co., 1431 Central Ave., Detroit, Mich.

TUBING, Flexible Metallic

(Flexible Tubing.)
Almond Mfg. Co., T. R., Ashburnham, Mass.
American Metal Hose Co., Waterbury, Conn.
American Metal Moulding Co., 146 Coit St., Irvington, N. J.
Anaconda Wire & Cable Co., 25 Broadway, New York, N. Y.
Auto-Brassflex. See National Metal Elec. Products Corp.
Auto-Steelflex. See National Metal Elec. Products Corp.
Breeze Corp., Inc., 24 S. 6th, Newark, N. J.
Eisler Electric Corp., 770 S. 13th St., Newark, N. J.
Flexo Spring Mfg. Inc., 34 South First, Brooklyn, N. Y.
National Elec. Products Corp., 1110 Fulton Bldg., Pittsburgh, Pa.
Riflex. See United Metal Hose Co.
Sleeper & Hartley, Inc., Worcester, Mass.
Time-O-Stat Controls Co., Elkhart, Ind.
Titeflex Metal Hose Co., Newark, N. J.
Triangle Conduit Co., Dry Harbor Rd. and Cooper Ave., Brooklyn, N. Y.
United Metal Hose Co., 724 Garrison Ave., New York, N. Y.
White Dental Mfg. Co. (Industrial Div.), S. S., 152 W. 42nd, New York, N. Y.

TUBING, Rubber

Rubber Tubing for Insulating Wire in Instruments and Telegraph Signal Lines.
Canfield Rubber Co., 702 Railroad Ave., Bridgeport, Conn.
Eisler Electric Corp., 756 S. 13th, Newark, N. J.
Faultless Rubber Co., Ashland, O.
Goodrich Rubber Co., B. F., Akron, O.
Rubber-Vac. See Eisler Electric Corp.
Tyler Rubber Co., Andover, Mass.
Vulcanized Rubber Co., 251 Fourth Ave., New York, N. Y.

TUBING, Varnished Fabric

Insulating Tubing—Spaghetti.
Acme Wire Co., New Haven, Conn.
Alpha Wire Corp., 520 Broadway, New York, N. Y.
Bentley-Harris Mfg. Co., Conshohocken, Pa.
Brand & Co., William, 268 Fourth Ave., New York, N. Y.
Empire. See Mica Insulator Co.
General Electric Co., Merchandise Dept., Bridgeport, Conn.
Goodrich Rubber Co., B. F., Akron, O.
Insulated Duct & Cable Co., Stokes, Trenton, N. J.
Isaline Corp. of America, 75 Cortlandt, New York, N. Y.
Irvington Varnish & Insulator Co., Irvington, N. J.
Lee Tire & Rubber Co., Conshohocken, Pa.
Mica Insulator Co., 200 Varick, New York, N. Y.

Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
Pearce Co., R. T., Covington, Ky. (Insulated Waxed Cotton.)
Turbo. See Brand & Co.
Varflex Corp., Rome, N. Y.

TURNED-UP BOXES AND CABINETS. See Cabinets, Sheet Steel.

TURNING TOOLS, COMMUTATOR. See Tools, Commutator Truing.

TWINE, Armature Winding; Torpedo Cord

Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
Winne & Son, Frank W., 42 N. Front, Philadelphia, Pa.

UNDERCUTTERS, Mica. See Slotting Machines & Tools, Commutator.

UNITS, Refrigerator Condenser. See Condenser Units, Refrigerator.

UNITS, Rods and Grids, Resistance

Acme Elec. Heating Co., Dept. R, 1217 Washington, Boston.
Allen-Bradley Co., 493 Clinton, Milwaukee, Wis.
Automatic Electric Heater Co., 1706 Race, Philadelphia, Pa.
Bradleyunit. See Allen Bradley Co.
Buffalo Products Co., Broome & Lafayette Sts., New York
Burger, J. P., 1813 Columbus Rd., Cleveland, O.
Calrod. See Edison General Elec. Appliance Co., Inc.
Chromalox. See Edwin L. Wiegand Co.
Clark Controller Co., 1146 E. 152nd, Cleveland, O.
Crown Coloring & Chemical Co., 33 W. 17th, New York.
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee.
Dalton Elec. Heating Co., 287 Bridge St., Salem, Mass.
Dalton-Marsh Co., 88 Holten, Danvers, Mass.
Daric Co., 35 E. 21st, New York, N. Y.
Di-El-Ite. See Wirt Co.
Dixon Crucible Co., Jos., Jersey City, N. J.
Dur-ristor. See Cutler-Hammer, Inc.
Eagle Elec. Mfg. Co., 79 Hall, Brooklyn, N. Y.
Edgerest. See Industrial Controller Div.
Edgewound. See Monitor Controller Co.
Edison General Electric Appliance Co., Inc., 5600 W. Taylor, Chicago, Ill.
Edgewound. See Monitor Controller Co. & Clark Controller Co.
Elec. Controller & Mfg. Co., 2700 E. 79th, Cleveland, O.
Elemite. See Louthan Mfg. Co.
Erie Resistor Corp., 644 W. Twelfth, Erie, Pa.
Fits-All. See Eagle Elec. Mfg. Co.
Fitz-All. See Rodale Mfg. Co.
Fitz-Rite. See Rodale Mfg. Co.
Fix-All. See Witlow Elec. Mfg. Co.
F & M. See Hiram Marks Elec. Co.
General Electric Co., Schenectady, N. Y.
Globar Corp., Niagara Falls, N. Y.
Glo-Well. See Eagle Elec. Mfg. Co.
Gold Seal Elecl. Co. of Ohio, Inc., 150 Park Ave., New York, N. Y.
Hance-Parker Mfg. Co., 397 West Main, Meriden, Conn.
Hankscraft Co., 615 E. Washington, Madison, Wis. (Oven Heater Unit.)
Hardwick, Hindle, Inc., 215 Emmett, Newark, N. J.
Hexwound. See Monitor Controller Co.
Industrial Controller Div. of Square D Co., S. Pierce & Hanover Sts., Milwaukee, Wis.
Industrial Heater Co., 300 Canal, New York, N. Y.
International Resistance Co., 2006 Chestnut, Philadelphia, Pa. (Radio Resistance.)
Krischer's Mfg. Co., 255 Calyer, Brooklyn.
Lautz Mfg. Co., 245 N. J. R. R. Ave., Newark, N. J.
Louthan Mfg. Co., East Liverpool, O.
Marks Elec. Co., Hiram, 304 Woodward Ave., Detroit, Mich.
Micamold Radio Corp., 1087 Flushing Ave., Brooklyn, N. Y.
Monitor Edgewound. See Monitor Controller Co. & Clark Controller Co.
Monitor Controller Co., 51 S. Gay, Baltimore, Md.
Nelco. See Nelson Electric Co.
Nelson Electric Co., Plant City, Fla.
Northern Electric Co., 2833 N. Western Ave., Chicago, Ill.
Ohmite Mfg. Co., 633 N. Albany Ave., Chicago, Ill.
Ohm-Spun. See States Co.
Op-Al Elec. & Mfg. Co., 1057 W. 30th, Indianapolis, Ind.
Parker & Co., J. C., 407 Bulletin Bldg., Philadelphia, Pa.
Poloron Elec. Mfg. Corp., 26 Waverly Pl., New York, N. Y.
Presto Products Co., 520 Broadway, New York, N. Y.
Prometheus Elec. Corp., 358 W. 13th, New York, N. Y.
Pyrox. See Westinghouse Elec. & Mfg. Co.
Reben Elec. Mfg. Co., 2024 Gravesend Ave., Brooklyn, N. Y.
Remco. See Reben Elec. Mfg. Co.
Repairall. See Waage Elec. Co.
Replaceall. See Waage Elec. Co.
Ribohm. See Ward Leonard Elec. Co.
Rodale Mfg. Co., 200 Hudson, New York, N. Y.
Rubicon Co., 20 N. Sixth, Philadelphia, Pa.
Sepco. See Automatic Electric Heater Co.
Smith & Co., T. C., 3915 Powelton Ave., Philadelphia, Pa.
Smoothwound. See Monitor Controller Co.
Snoco. See Snow & Co.
Snow & Co., E. W., Rochester, N. Y.
Stupakoff Laboratories, 6627 Hamilton Ave., Pittsburgh, Pa.
Super. See Northern Elec. Co.
Superior Resistor Corp., 334 Badger Ave., Newark, N. J. (Radio)
United Metal Art Mfg. Co., 293 Wyckoff Ave., Brooklyn, N.Y.
Wirtrohm. See Ward Leonard Elec. Co.
Waage Elec. Co., 5100 W. Ravenswood Ave., Chicago.
Ward Leonard Elec. Co., 31 South, Mt. Vernon, N. Y.
Warren Elec. Appliance Co., Warren, Pa.
Watlow Elec. Mfg. Co., 1320 N. 23rd, St. Louis, Mo.
Westinghouse Elec. & Mfg. Co., Mansfield, O.
White Dental Mfg. Co., S. S., 152 W. 42nd, New York, N. Y. (Radio.)
Wiegand Co., Edwin L., 7530 Thomas Blvd., Pittsburgh, Pa.
Wirt Co., 5221 Greene, Philadelphia, Pa.

VACUUM CLEANER BAGS. See Bags, Vacuum Cleaner.

VACUUM DRYING & IMPREGNATING OVENS. See Ovens, Industrial.

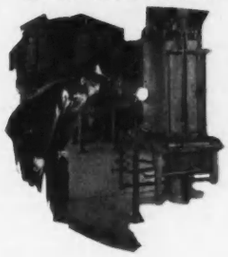
VACUUM PUMPS. See Pumps, Vacuum.

VALVES, Electrically Operated

Anderson & Co., C. J., 212 W. Austin Ave., Chicago, Ill.
Asco. See Automatic Switch Co.
Automatic Switch Co., 154 Grand, New York.
Chapman Valve Mfg. Co., Indian Orchard, Mass.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee
Electric Steam Radiator Co., 518 Stewart, Seattle, Wash
Electric & Valve Mfg. Co., 64 Murray, New York, N. Y.
Fabrice Thermostatic Control Co., 4750 Sheridan Rd., Chicago, Ill.
Gas-Gard Co., 375 Main St., E., Rochester, N. Y. (Gas.)
General Electric Co., Schenectady, N. Y.
Golden-Anderson Valve Specialty Co., 1385 Fulton Bldg., Pittsburgh, Pa.

Fischerarm
The best in flexible arms for portable and therapeutic lamps, etc.
MADE of steel and brass in all Finishes. Special arms designed to your requirements.
Write for prices.
CHAS. FISCHER SPRING CO.
238 Kent Avenue Brooklyn, N. Y.

FANSTEEL
for
Contact Points



99.95%
Pure Metal
. . . necessary for trouble-free operation

PURITY in metal is essential. Even 1% impurity would seriously impair performance, but Fansteel metals are made and **kept** 99.95% pure every day in the year by strict laboratory control. If you're not using Fansteel Contacts give them a trial.

Even if your present contacts are giving fair satisfaction, it might pay you to consult with the Fansteel laboratory as to the value of contacts designed especially for your product, possibly at a saving over what you pay now.

FANSTEEL PRODUCTS CO., INC.
NORTH CHICAGO, ILL.
Pioneer Makers of Tungsten Contact Points

CAN HOTEL SERVICE BE DIFFERENT?

. . . just register once
at **THE NEW YORKER**
. . . you will see

HERE is not just the largest hotel in the world's largest city . . . here is a new and quite novel idea in hotel management . . . a friendly hospitality, refreshingly old fashioned in spirit, strikingly modern in manner . . . The New Yorker idea of "individualized service" is creating a new and pleasant phase in contemporary hotel living.

* * *

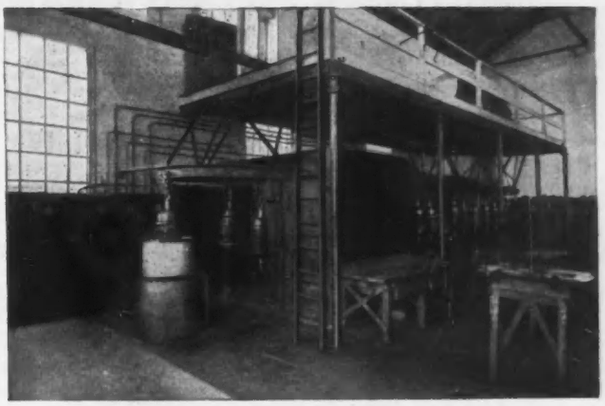
THE NEW YORKER has 2500 rooms . . . every one with radio, tub and shower bath, Servidor, circulating ice-water . . . four popular-priced restaurants . . . floor secretaries . . . located with *immediate* access to theatres, shops and business . . . direct tunnel connection to Pennsylvania Station . . . B. & O. Motor Coach connection . . . room rates $3.50 a day and upward. 85% of the rooms are $5 or less. Suites $11 a day and upward.

THE NEW YORKER HOTEL

RALPH HITZ, *Managing Director*

34th Street at 8th Avenue, New York City

Results of Good Oven Practice



Increase Your Product Uniformity

When you bake the insulating varnish on your armatures and coils you subject every unit to the same pre-determined drying conditions. Consequently they are all dried to the same degree.

You drive off the varnish thinner and lighter volatiles which, if allowed to remain, cause rapid deterioration of the insulating fabric.

You eliminate the danger of air pockets in the interior of the coil.

You develop the highest dielectric strength of your insulating varnish.

You greatly increase the mechanical strength of your coils.

And — you give your completed product the greatest protection against those arch enemies of electrical power units — Dust and Moisture.

Baking insures a more uniform product and a much better product.

For complete information write for Bulletin 27-E.

YOUNG BROTHERS COMPANY
6523 MACK AVENUE, DETROIT, MICHIGAN

DISTRICT SALES OFFICES:

30 Church Street . . . . . New York
1323 Guarantee Title Bldg. . . . . Cleveland
432 Pennant Bldg. . . . . St. Louis
273 Seventh Street . . . . . San Francisco
Hiram Walker & Sons Metal Products, Limited, ... Walkerville, Ont., Canada
908 Ellicott Square . . . . . Buffalo
20 East Jackson Blvd. . . . . Chicago
807 San Fernando Bldg. . . Los Angeles
248 Central Bldg. . . . . Seattle, Wash.
10 High Street . . . . . Boston, Mass.

OVENS FOR:

Core and Mold baking.
Low temperature heat treating.
Drying.
Japanning and enameling.
Electrical appliance baking.
Adapted to all methods of heating.

INDUSTRIAL OVENS

Magnet Wire
Electrical Cordage
Rubber Covered Wire
Annunciator Wire
Bare Flexible Copper
Braids and Cables
Coils of All Types

The Wheeler Insulated Wire Co.
Bridgeport, Conn.

RESISTANCE WIRES
ROUND and FLAT
We manufacture a full line of Nickel-chromium, copper-nickel and other alloys of high quality, bare and covered. We can make it to your advantage to deal with us. Tell us what you use and ask us to prove our claims.
—GILBY WIRE—
COMPANY
Wilbur B. Driver, Pres., Newark, N. J.

Cochrane's
WAXES
Compounds
Paints and Varnishes
for every insulation purpose
41 years in the business. Write for samples of our latest finishing and saturating wax.
Cochrane Chemical Company
Established 1887
432 Danforth Ave., Jersey City, N. J.

VALVES, Electrically Operated—Continued
Lunkenheimer Co., Cincinnati, O.
Minneapolis-Honeywell Regulator Co., Fourth Ave. & 26th Minneapolis, Minn.
Michigan Metal Products Co., Battle Creek, Mich.
Nacco Mfg. Co., 1482 Clara Ave., St. Louis, Mo
Northside Elec. Co., 4227 Spring Grove Ave., Cincinnati O
Nu-Way Water Heater Control, Inc., 368 Erie Bldg., Cleveland, O.
Savutime Devices, Inc., 88 Manhattan, Rochester, N. Y.
St. Louis Motor Valve Co., St. Louis, Mo.
Sentinel. See Electric Steam Radiator Co.
Tagliabue Mfg. Co., C. J., 18-83rd St., Brooklyn, N. Y.
Teeple Co., L. R., 340 E. Ninth, Portland, Ore. (Gas.)
Time-O-Stat Controls Co., Elkhart, Ind.
Victor. See Lunkenheimer Co.
Zeco. See Zisch Engineering Corp.
Zisch Engineering Corp., 39 Avenue L, Newark, N. J. (Gas.)
VARNISH. See Paint, Varnish, Lacquer.
VARNISHED TAPE. See Tape, Varnished Fabric.
VARNISHED TUBING. See Tubing, Varnished Fabric.
VOLT BOXES. See Instruments, Laboratory Standard.
VOLTMETERS. See Instruments.
VULCANITE. See Rubber, Hard.

VULCANIZERS, WIRE INSULATION

American Insulating Machinery Co., 519 Huntington Ave., Philadelphia, Pa.
Biggs Boiler Works Co., Akron, Ohio.
WASHERS, FIBRE. See Fibre.
Washers, Non-Metallic. See also Gaskets, Fibre.
American Nut & Bolt Fastener Co., Pittsburgh, Pa.
Hobbs Mfg. Co., Worcester, Mass.
Kantlink. See National Lock Washer Co., Positive Lock Washer Co., Mansfield Lock Washer Co., Reliance Mfg. Co. & American Nut & Bolt Fastener Co.
Keystone. See Positive Lock Washer Co.
National Lock Washer Co., Newark, N. J.
Positive Lock Washer Co., Ave. A & Miller, Newark, N. J
Shakeproof Lock Washer Co., 2533 N. Keeler Ave., Chicago.
St. Louis Malleable Casting Co., 7701 N. Conduit Ave., St. Louis, Mo.

WASHERS, Metallic

Bridgeport Brass Co., 774 E. Main, Bridgeport, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Chicago Nut Mfg. Co., 2513 Cullerton, Chicago, Ill.
Hubbard Spring Co., M. D., Pontiac, Mich.
Mansfield Lock Washer Co., Mansfield O.
Massachusetts Machine Shop, Inc., Boston, Mass.
New England Screw Co., Dept. A., 44 Farnsworth, Boston.
Quadriga Mfg. Co., 213 W. Grand Ave., Chicago, Ill.
Reliance Mfg. Co., Massillon, O.
Wrought Washer Mfg. Co., 46 S. Bay, Milwaukee, Wis.
WATTMETERS. See Instruments.

WASHERS, Non-metallic

See also Gaskets, Fibre.
Michigan Leather Washer Co., 548 E. Fort, Detroit, Mich.

WAX AND COMPOUNDS

Wax and Compound, Sealing and Filling.....See W
Junction Box, Potheads, Battery Tops, Bolt Head Holes.
Wax and Compound.....See S
Saturating and Finishing, Braided Wire, Impregnating Fabric and Paper.
Chatterton's Compound.....See C
Ackurate Rubber Co., 25 Beaver, New York, N. Y. W
Ajax. See Sherwin-Williams Co.
Asphalt Products Co., 6531 S. State, Chicago.... S
Bishop Wire & Cable Corp., 420 E. 25th, New York, N. Y.....
Biwax Corp., 208 S. La Salle, Chicago, Ill..... W S
Brand & Co., William, 268 Fourth Ave., New York, N. Y. ..... W
Bulls-Eye. See Zinsser & Co.
Cablelene. See Vacuum Oil Co.
Candy & Co., 35th and Maplewood Ave., Chicago W S
Cerowax. See Vacuum Oil Co.
Clifton Mfg. Co., 65 Brookside Ave., Boston.....
Cochrane Chemical Co., 432 Danforth Ave., Jersey City, N. J. ..... W S
Dolph Co., John C., 168 Emmet, Newark, N. J W
Di Electric Puttie. See Ackurate Rubber Co.
Ever-Protect. See National Cable Compound Co.
Flake White. See Williams Co., F. M.
General Electric Co., Bridgeport, Conn..... W
George Co., P. D., St. Louis..... W
Globe Chemical Co., Murray Road & Big 4 R. R. St. Bernard, Cincinnati, O..... W S
Goldo Brown. See Williams Co., F. M.
Great Lakes Thread & Yarn Co., Div. of General Cable Corp., 5133 Wesson Ave., Detroit... W
Hercules Powder Co., 975 Market, Wilmington, Del. (Wood Rosin) ..... S
Hexsulate. See Tar Products Corp.
Imco. See Great Lakes Thread & Yarn Co.
India Red Seal. See Williams Co., F. M.
Insulatine Co., 1 Broadway, New York..... W
Insulation. See Vacuum Oil Co.
Knox & Morse Co., 80 Freeport, Boston, Mass..... W S
Leverite. See Mitchell-Rand Mfg. Co.
Lime Seal. See Mitchell-Rand Mfg. Co.
McGill Mfg. Co., Valparaiso, Ind..... C
Mineralac Elec. Co., 1045 Washington Blvd., Chicago, Ill. ..... W
Mitchell-Rand Mfg. Co., 19 Vesey, New York.... W S
Mule-Hide. See Lehon Co.
National Cable Compound Co., Mitchell, Ind.... W
National Wax Co., 189 W. Madison, Chicago, Ill. .. S
Nu-Blac. See Star Porcelain Co.
Par Flexo. See Williams Co., F. M.
Rubberseal. See Mitchell-Rand Mfg. Co.
Rub-Flexo. See Williams Co., F. M.
Seidner & Enequist, Inc., 86 Hausman, Brooklyn, N. Y. ..... W

Sherwin-Williams Co., Cleveland, O..... W
Standard Varnish Wks., 433 4th Av., New York.. W
Standard Wax & Import Co., 110 E. 42nd, New York, N. Y. ..... W S
Star Porcelain Co., Muirhead Ave., Trenton, N. J. W C
Tacrite. See Seidner & Enequist, Inc.
Tar Products Corp., Indiana Trust Bldg., Providence, R. I. ..... S
Trotter & Co., E. T., 578 Johnson Ave., Brooklyn, N. Y. ..... W S
Vacuum Oil Co., 61 Broadway, New York, N. Y. W
Warner-Quinlan Co., 2 Park Ave., New York, N. Y. C
Waverly Oil Wks., 54th and A. V. R. R., Pittsburgh, Pa. ..... S
Williams Co., F. M., 1233 Prospect Ave., Brooklyn, N. Y.
Zinsser & Co., 48 Vesey, New York, N. Y..... W
WEDGE DRIVERS. See Tools, Commutator.
WELDS, Lamp Lead-in. See Filaments, Incandescent

WELDING AND CUTTING OUTFITS

Electric Arc, Spot, Butt and Seam Metal Welders and Metal Cutting Outfits.
Acme Elec. Welder Co., 1850 W. Fulton, Chicago, Ill.
A. E. F. See American Electric Fusion Corp.
Agnew Electric Welder Co., Milford, Mich.
Allan Mfg. & Welding Co., Inc., 728 Washington, Buffalo
Almane. See Allan Mfg. & Welding Co., Inc.
Alternarc. See Electric Arc Cutting & Welding Co.
American Elec. Fusion Corp., 2610 Diversey Ave., Chicago
Burke Electric Co., Erie, Pa.
Cushing Mfg. Co., 5617 Pacific Blvd., Los Angeles, Cal
Economy Electric Products Co., 2400 Woodland Ave., Cleveland, O.
Eisler Electric Corp., 770 S. 13th St., Newark, N. J.
Electric Arc Cutting & Welding Co., 156 Jelliff Ave., Newark, N. J.
Electric Welding, 744 Court, Brooklyn, N. Y.
Electric Welding Machine Co., 1530 Larned, E., Detroit.
Farwest Electric Welder Co., 1107 Northlake Ave., Seattle.
Federal Machine & Welder Co., Dana Ave., Warren, O.
Fleet-Weld. See Lincoln Elec. Co.
Fusion Welding Corp., 10257 Torrence Ave., Chicago.
General Electric Co., Schenectady, N. Y.
General Engrg. & Supply Co., 160 5th Ave., New York, N. Y
Hansen. See Northwestern Mfg. Co
Hobart Mfg. Co., Simpson & Penn Sts., Troy, Ohio
Hollup Corp., C. H., 3333 W. 48th Place, Chicago, Ill.
Lincoln Electric Co., Cott Rd. and Kirby Ave., Cleveland.
Lundy Co., E. A., Fulton Bldg., Pittsburgh, Pa.
Macleod Co., 2232 Bogen, Cincinnati, O.
McAdams Co., J. C., New Britain, Conn.
Nigg Engineering Corp., Second St. & Covina Blvd., Covina, Cal.
Northwestern Mfg. Co., 486 Clinton, Milwaukee, Wis
Owen Elec. Mfg. Co., Fayetteville, N. C.
Plastic Arc. See Wilson Welder & Metal Co.
Pyrotip. See General Elec. Co.
Quasi-Arc., Inc., 11 W. 42nd St., New York, N. Y.
Rhason Mfg. Co., 124 45th, Union City, N. J.
Ryerson & Son, Jos. T., 2558 W. 16th, Chicago, Ill.
Sellars Arc Welder Co., 1200 Fourth Ave., Seattle, Wash.
Seneca Electric Welder Corp., 5057 Woodward, Detroit, Mich.
Siemund Wenzel Electric Welding Co., 79 Hancock, Long Island City, N. Y.
Swift Elec. Welder Co., 2567 W. Grand Blvd., Detroit.
Taylor-Winfield Corp., Mahoning Ave., Warren, O.
Thomson-Gibb Electric Welding Co., Lynn, Mass.
Toledo. See Thomson-Gibb Elec. Welding Co.
Una Welding & Bonding Co., 1615 Collamer Ave., Cleveland, O.
U. S. L. Battery Corp., Niagara Falls, N. Y.
Weldite. See Fusion Welding Corp.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Wilson Welder & Metal Co., Hoboken factory, Terminal Bldg., Hoboken, N. J.
Zeus. See Thomson-Gibb Elec. Welding Co.
WHEATSTONE BRIDGES. See Instruments, Laboratory Standard.

WICKS, Lubricating

Brawley Felt Co., Inc., T. R., 279 20th, Brooklyn, N. Y.

WINDERS

Armature & Field Coil. See Winding Machines, Armature & Field Coil
Coil. See Winding Machines, Armature & Field Coil
Electromagnet. See Winding Machines, Induction Coil.
Filament. See Machines, Lamp Making
Induction Coil. See Winding Machines, Induction Coil
Loop. See Winding Machines, Armature & Field Coil

WINDING MACHINES, Armature and Field Coil

Acme Elec. & Mfg. Co., 1447 Hamilton Ave., Cleveland, O.
Armature Coil Equipment Co., 3415 Forestdale Ave., Cleveland, Ohio.
Browning. See Mutual Foundry & Machine Co.
Chapman Electric Works, P. E., 1320 Chouteau Ave., St. Louis Mo.
Columbia Machine Works & Malleable Iron Co., Atlantic Ave. & Chestnut St., Brooklyn, N. Y.
Comstock Mfg. Co., Wilkes-Barre, Pa.
Conran, Frederick M., 107 Colden, Newark, N. J.
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
Eisler Electric Corp., 770 S. 13th St., Newark, N. J.

WINDERS
Spaced Resistor In Tube or Cord Type
Also for Dynamic Coils; Radio and Electrical Transformers. Vitreous Enamel Electric Ovens.
Designer and builder of special purpose machinery
FREDERICK M. CONRAN
107 Colden St., Newark, N. J.

Handy. See Armature Coil Equipment Co., 3415 Forestdale Ave., Cleveland, Ohio.
Herald Electric Co., 29 East End Ave., New York, N. Y
Hunsdorf, Wm., 2056 E. Fourth, Cleveland, O
Liberty Starter Co., 241 Vinewood Ave., Detroit, Mich.
Lipe, W. C., 208 S. Geddes, Syracuse, N. Y.
Meissner Mfg. Co., 522 S. Clinton, Chicago, Ill.
Mutual Foundry & Machine Co., Atlanta, Ga.
Onan, David W., 43 Royalstone Ave., Minneapolis, Minn
Peerless. See Electric Service Supplies Co.
Ridlon Co., Frank, 253 A St., Boston, Mass.
Sazur. See Electric Service Supplies Co.
Seifert, E. R., 315 E. Washington, Syracuse, N. Y.
Superior. See Armature Coil Equipment Co.

WINDING MACHINES, Induction Coil

Acme Elec. & Mfg. Co., 1447 Hamilton Ave., Cleveland, O.
Belden Mfg. Co., 4631 W. Van Buren, Chicago, Ill.
Conran, Frederick M., 107 Colden, Newark, N. J.
Eureka Tool & Machine Co., 42 Walnut, Newark, N. J.
Leesona. See Universal Winding Co.
Lipe, W. C., 208 S. Geddes, Syracuse, N. Y.
Morris Register Co., 29th & Broadway, Council Bluffs, Iowa.
Radio Production Machinery Co., 213 Centre, New York.
Seifert, E. R., 315 E. Washington, Syracuse, N. Y.
Universal Winding Co., Boston, Mass.
Viking Tool & Machine Co., 747 65th, Brooklyn, N. Y.
Weehawken Engineering & Mfg. Co., 525 Gregory Ave., Weehawken, N. J.
WINDINGS. See Coils, Finished.

WINDOW SHADES, Factory

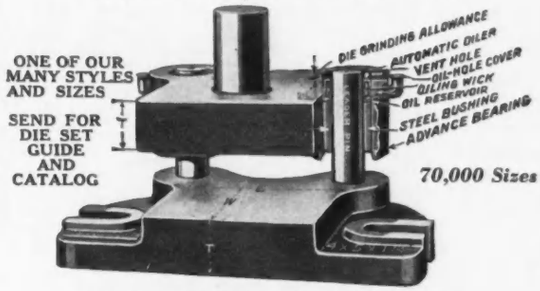
Athey Co., 6142 West 65th St., Chicago, Ill.
WIRE (Cable) (Cord), Aluminum. See Aluminum.
Copper Clad. See Wire, Copper Clad.
Forms. See Forms, Wire.
Frames. See Forms, Wire.
Fuse. See Fuses and Fuse Wire.
Lamp & Tube Filament. See Filaments, Incandescent Lamp.
Magnet. See Wire, Insulated.
Molybdenum. See Molybdenum.
Phosphor Bronze. See Phosphor Bronze
Platinum. See Platinum.
Radio Bus. See Wire, Bare.
Scrapers. See Strippers.
Strippers. See Strippers.
Tungsten. See Filament, Incandescent Lamp

WIRE, Bare

Armature Banding ..... See B
Copper Wire ..... See C
Iron Wire ..... See S
Phosphor Bronze ..... See B
Radio Bus Wire ..... See C
Resistance Wire ..... See R
Steel Wire ..... See S

Acme. See Alloy Metal Wire Co.
Alpha Wire Corp., 520 Broadway, New York.. C R
Advance. See Driver Harris Co.
Alloy Metal Wire Co., Moore, Pa. ..... C R
American Copper Products Corp., 233 Broadway, New York, N. Y. ..... C R
American Electrical Works (Phillipsdale), Providence, R. I C
American Insulated Wire, Div. of General Cable Corp., 954 W. 21st, Chicago ..... C S
American Steel & Wire Co., 208 S. La Salle
Anaconda Wire & Cable Co., 25 Broadway, New York, N. Y. C
Anylite Elec. Co., 200 Murray, Fort Wayne, Ind.... C
Atlantic Insulated Wire & Cable Co., Div. of General Cable Co., Rome, N. Y. C
Ballast. See Gilby Wire Co.
Baltimore Copper Mills, Div. of Revere Copper & Brass, Inc., Baltimore, Md. C
Bassett Metal Goods Co., Derby, Conn. (General Sales Agent, Hatheway & Co., 16 Hudson, New York, N. Y. C
Belden Mfg. Co., 4631 W. Van Buren, Chicago.... C S
Beldenite. See Belden Mfg. Co.
Bradford, Kyle & Co., Plymouth, Mass. ..... S
Braidite. See Cornish Wire Co.
Brenvar. See American Insulated Wire & Cable Co.
Bridgeport Brass Co. Bridgeport, Conn..... C
Calido. See Driver Harris Co.
Chase Brass & Copper Co., 236 Grand, Waterbury, Conn.
Chromel. See Hoskins Mfg. Co.
Chromlo. See National-Harris Wire Co.
Climax. See Driver Harris Co.
Comet. See Driver Harris Co.
Iron Plate Co., Edw. N., 70 Snip, Providence, R. I C
Copel. See Hoskins Mfg. Co.
Copperweld Steel Co., Glassport, Pa..... C S
Cornish Wire Co., 30 Church, New York, N. Y. C
Corwico. See Cornish Wire Co.
Crescent Ins. Wire & Cable Co., Trenton, N. J.. C
Cromlo. See Gilby Wire Co.
Cupron. See Gilby Wire Co.
Detroit Insulated Wire Co., Div. of General Cable Corp., Detroit, Mich. C
Dumet. See Chicago Insulated Wire & Mfg. Co.
Driver-Harris Co., Harrison, N. J. ..... R
Electron. See Bassett Metal Goods Co.
Excellcier. See Branford Elec. Co.
Fullman Mfg. Co., 1209 Jefferson, Latrobe, Pa.
Gilby Wire Co., Riverside Ave., Newark, N. J. R
Gokimark Co., James, 83 Warren, New York.. C
Hope Webbing Co., 1005 Main, Pawtucket, R. I. (Braided Wire Tape) C
Hoskins Mfg. Co., 4435 Lawton Ave., Detroit, Mich. ..... R
Hudson Wire Co., Ossining, N. Y..... C R
Ideal. See Driver Harris Co.
Indiana Rubber & Insulated Wire Co., 620 W. Jackson Blvd., Chicago, Ill..... C S
Karma. See Driver Harris Co.
Keystone. See Fullman Mfg. Co.
Lucero. See Driver Harris Co.
Marion Insulated Wire & Rubber Co., Marion, Ind. C

Automatically Oiled Die-Sets



E. A. BAUMBACH MFG. CO.
GENERAL OFFICE AND WORKS
1810 South Kilbourn Ave., CHICAGO, ILLINOIS
Sales and Engineering Offices—Principal Cities U.S.A. and Canada

ELCO MACHINE SCREWS

Are made by Specialists who know what a good screw should be, and also how to make them.

May we receive your inquiries?

ELCO TOOL & SCREW CORPORATION
1818 BROADWAY, ROCKFORD, ILLINOIS

TURBO OIL TUBING

THE BEST PROTECTION

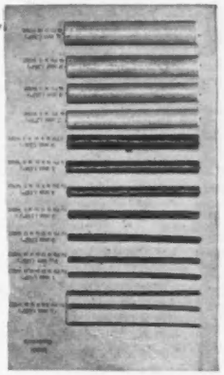
Inside and outside impregnation

Contains NO NITRO CELLULOSE COMPOUNDS and is therefore SLOW BURNING, also HIGH DIELECTRIC STRENGTH.

Send for this sample set of TURBO Oil Tubing and prove by actual tests that it is all that we claim for it. You will find it tougher and of a smoother finish than ordinary tubing. Each insulating layer thoroughly baked when applied.

Because of its construction TURBO Oil Tubing is the *only tubing* manufactured in a size as small as .020" (½ m/m) I.D. to cover a No. 25 B & S gauge bare wire.

This sample set will convince you that you have at last "tracked down" the best in insulated tubing. Write today.



WILLIAM BRAND & CO.
268 Fourth Avenue
New York, N. Y.

REPRESENTATIVES:
Chicago: J. J. Glenn & Co., 9 So. Clinton St.; **Detroit:** N. J. Clark & Co., 2885 East Grand Blvd.; **Rochester:** Gilbert Gislason, 124 Westchester Ave.; **Hartford:** Eugene P. Pack Co., 968 Farmington Ave.; **Los Angeles:** Lombard Smith & Co., 324 No. San Pedro St.

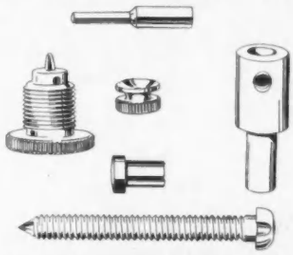
CLEVELAND ACME BRAND

Send Us Your Specifications for Estimate

TRANSFORMERS
AUDIOS ••• CHOKES
COIL WINDERS

Acme Electric & Mfg. Co.
1447 Hamilton Ave.
Cleveland, Ohio

MATTATUCK PRODUCTS



Screw Machine Products

Send Samples or Specifications and Quantity Needed.

The Mattatuck Mfg. Co.
Waterbury Conn.

MATTATUCK PRODUCTS

The FRANCE WIRE STRIPPER

Outstripping the old methods five to one, has won the FRANCE WIRE STRIPPER its place in up-to-date production methods. Write for particulars of our free-trial offer in your plant at no obligation.

We also wind coils and manufacture wire cutting and coil winding machinery. Send for bulletin and further information.

THE FRANCE MANUFACTURING CO.
10306 Berea Rd., Cleveland, Ohio
Manufacturers Since 1913

WIRE, Bare—Continued
Monex. See Standard Alloy Wire Co.
National-Harris Wire Co., Newark, N. J..... R ..
Nehring Electrical Works, De Kalb, Ill. ..... C ...
Nichrome. See Driver Harris Co.
Novar. See Standard Alloy Wire Co.
Page Steel & Wire Co., Bridgeport, Conn..... B
Peerless. See Alloy Metal Wire Co.
Phillips Wire Co., Div. of General Cable Corp., Pawtucket, R. I..... C ....
Phono-Electric. See Bridgeport Brass Co. & Standard Underground Cable Co.
Premier. See Alloy Metal Wire Co.
Providence Insulated Wire Co., Providence, R. I.. C ....
Race. See Ross Wire Co.
Revolute Wire Co., Hastings-on-Hudson, N. Y.... C ....
Rice Co., A. H., Pittsfield, Mass. ..... C ....
Roebling's Sons Co., John A., Trenton, N. J..... C .. B
Rome Wire Co., Div. of General Cable Co., Rome, N. Y. ..... C ....
Ross Wire Co., 69 Bath, Providence, R. I..... C ....
Seneca Wire & Mfg. Co., Fostoria, O. ..... B
Sherardized. See Alloy Metal Wire Co.
Silectron. See Standard Alloy Wire Co.
Solar. See Gilby Wire Co.
Spargo Wire Co., J. A., Rome N. Y..... C ....
Standard Alloy Wire Co., Div. of National-Harris Wire Co., Newark, N. J..... R S
Standard Underground Cable Co. (Div. of General Cable Corp.), Pittsburgh, Pa. ..... C ....
Super-Insulated Wire Co., Plymouth, Mass. ..... C ....
Superior. See Alloy Metal Wire Co.
Talking Tape. See Hope Webbing Co.
Therlo. See Driver Harris Co.
Tophet. See Gilby Wire Co.
Tru-Lay. See Page Steel & Wire Co.
Valley Narrow Fabric Co., Falls, R. I.
Wheeler Insulated Wire Co., Bridgeport, Conn.. C ....

WIRE CLOTH. See Cloth, Wire.

WIRE, Copper Clad

Copperweld Steel Co., Glassport, Pa.
Eisler Electric Corp., 770 S. 13th St., Newark, N. J.
Standard Underground Cable Co., Div. of General Cable Corp., Pittsburgh, Pa.

WIRE SOLDER. See Solder, Bar and Wire.

WIRE DRAWING MACHINES

Drawing and Re-drawing Mill Equipment for Small Wires
American Insulating Machinery Co., 519 Huntington Ave. Philadelphia, Pa.
Eisler Electric Corp., 770 S. 13th St., Newark, N. J.
Sleeper-Hartley, Inc., Worcester, Mass.
Torrington Manufacturing Co., 70 Franklin, Torrington Conn.
Vaughn Machinery Co., Cuyahoga Falls, Ohio.
Wire Machinery Corp. of Am., New Haven, Conn.

WIRE FORMING MACHINE

Seifert, E. R., 315 E. Washington, Syracuse, N. Y.

WIRE, Insulated

KEY

Annunciator, Office, Bell Wire....See A
Asbestos Covered Heater Cord.....See Is
Asbestos Covered Magnet Wire....See M
Enameled Magnet Wire .....See M
Fixture Wire .....See B
Flexible Reinforced Heavy Duty Cord .....See F
Heater Cord .....See H
Ignition Cable .....See B
Lamp Cord .....See B
Magnet Wire .....See M
Rubber Covered Wire & Cable..See R
Stove Wire .....See H
Telephone Cord .....See T

A-A Wire Co. (Div. of General Cable Corp), 420 Lexington Ave., N. Y. C.. R .....
A-1 Brand. See American Insulated.
Acme Wire Co., New Haven, Conn.
Enamaled Silk, Cotton ..... M
Amelectric. See American Elec.
American Braiding Co., Holyoke, Mass. R .....
American Copper Products Corp., 233 Broadway, New York, N. Y..... .....
American Electrical Works (Philipsdale), Providence, R. I..... M
American Enameled Magnet Wire Co., Muskegon, Mich. ..... M
American Insulated Wire, Div. of General Cable Co., 954 W. 21st, Chicago, Ill. ..... M
21st, Chicago, Ill ..... A
American Insulated Wire Corp., 45 Baker, Providence, R. I..... R F .. A T ..
American Steel & Wire Co., 208 S. La Salle, Chicago, Ill ..... R F H A T M
Americore. See American Steel.
Amerite. See American Steel.
Amerize. See American Steel.
Amparak. See American Steel.
Anaconda Wire & Cable Co., 25 Broadway, New York, N. Y..... R F .. A .. M
Anaconda Wire & Cable Co., Maring Wire Branch, Muskegon, Mich. (Silk, Enamel) ..... M
Ansonia Electrical Co., Ansonia, Conn
Silk Cotton Enameled ..... A .. M
Armorlokt. See American Steel.
Atlantic Insulated Wire & Cable Co., Div. of General Cable Co., Rome, N. Y. ..... R .. H .. T M
Bat Stake Insulated Wire & Cable Co., Paydras (Mattapan) 26, Boston ..... R .....
Belden Mfg. Co., 4631 W. Van Buren Chicago, Ill. ..... R F H A T M
Bishop Wire & Cable Corp., 420 E. 25th, New York, N. Y. ..... R F .....
Boston Insulated Wire & Cable Co., 65 Bay, Boston, Mass. ..... R F H .....
Bradford, Kyle & Co., Plymouth, Mass. ..... M
Cablex. See Collyer Insulated Wire Co.
Celatsite. See Acme Wire Co.
Collyer Insulated Wire Co., Pawtucket.. R F H .....
Colorbeston. See General Elec. Co.
Colorrubber. See Belden Mfg. Co.
Condex. See Simplex Wire Co.
Copperweld Steel Co., Rankin, Pa..... R ..... T ..
Cotenamel. See Belden Mfg. Co.
Cottonite. See Acme Wire Co.
Crescent Braid, Inc., Providence, R. I..... H .....
Crescent Ins. Wire & Cable Co., Trenton R F H A T M
Crescord. See Crescent Ins. Wire & Cable Co.
Davis-Jones Insulated Wire Co., Pawtucket, R. I. ..... R F H A T ..
Deltabeston. See York Insulated.
Detroit Insulated Wire Co., Div. of General Cable Corp., Detroit, Mich.... R ..... T ..
Diamond Braiding Mills, Chicago Heights R F H .... M
Di-Noburn. See Diamond Braiding Mill. delphia, Pa.
Dreadnaught. See Indiana Rubber Co.
Driver-Harris Co., Harrison, N. J..... R .. H .....
Dudlo Mfg. Co., Div. of General Cable Corp., Fort Wayne, Ind.. ..... M

Ducatto. See Dudlo Mfg. Co.
Durablit. See Anaconda Wire & Cable Co.
Duracord. See Anaconda Wire & Cable Co.
Durawire. See Anaconda Wire & Cable Co.
Duro. See McElroy, C. H.
Eagle. See Goldmark Co., James.
Eastern Insulated Wire Co., Tilton, N. H. R .....
1885. See Chicago Insulated Wire.
Enamelite. See Acme Wire Co.
Enterite. See Rome Wire Co.
Fibrex. See Simplex Wire Co.
Flexible Woven Cable Co., 755 Boylston, Boston, Mass. ..... F .....
Flex-O-Cord. See Packard Elec. Co.
Garco. See General Asbestos Co.
Gavitt Mfg. Co., West Brookfield, Mass. ..... T ..
GE-Flex. See General Elec. Co.
General Asbestos & Rubber Co., Charleston, S. C. ..... H .....
General Elec. Co., Merchandise Dept., W325, Bridgeport, Conn ..... R F H ... M
Giant. See Colly- Insulated Wire.
Gilby Wire Co., Riverside Ave., Newark, N. J. ..... H .....
Globe Insulated Wire, 148 Old Colony Ave., Wollaston, Mass. ..... R .....
Goldmark Co., James, 83 Warren, New York, Annunciator and Asbestos, Cotton, Silk and Enameled Magnet ..... A .. M
Goodyear Rubber Insulating. See Graybar Electric Co.
Graybar Elec. Co., Graybar Bldg., Lexington Ave. & 43rd St., New York, N. Y. R ..... T ..
Grimshaw See New York Ins.
Hatex See Hatfield Rubber Wks.
Hatfield Rubber Wks., Inc., Hillside & Long Aves., Hillside, N. J..... R F H .. T ..
Hazacord. See Hazard Insulated Wire Works.
Hazard Insulated Wire Works, Div. of Okonite Co., Wilkes-Barre, Pa.... R F .. A .. M
Holyoke Co., 621 Broadway, New York.. R ... A .. M
Inca Mfg. Co., Fort Wayne, Ind..... ..... M
Indiana Rubber & Insulated Wire Co., 620 West Jackson Blvd., Chicago, Ill... R F H .....
I. X. L. See Collyer Insulated.
Kable. See Safety Cable Co.
Kenrite. See American Insulated.
Kerite Ins. Wire Cable Co., 30 Church, New York, N. Y. ..... R .....
Kilo, Co., 2 E. 23d, New York..... ..... T M
Koelle, Frederick C., Real Estate Trust Bldg., Philadelphia, Pa. ..... T ..
Lowell Insulated Wire Co., Lowell, Mass. R F H .....
Liberty. See Nat. Metal Molding
Loxsteel. See Hazard Insulated Wire Works.
McElroy, C. H., Lowell, Mass..... R ..... T ..
Marion Insulated Wire & Rubber Co., Marion, Ind. ..... R F H A T ..
Massachusetts Elec. Mfg. Co., West Lynn, Mass. ..... M
Montgomery Co., J. R., Windsor Locks, Conn. ..... T
National Elec. Products Corp., Pittsburgh R F H A T M
National-Harris Wire Co., Newark, N. J. R .....
New England Elec. Wks., Lisbon, N. H.. R .....
N. E. See New England Elec. Wks.
New York Insulated Wire Co., 114 Liberty, New York, N. Y. ..... R .....
Nitro. See Belden Mfg. Co.
O. K. See Phillips Wire Co. Also
Okocord. See Okonite Co.
Okonite Co., Passaic, N. J..... R .....
Ozex. See Simplex Insulated Wire
Packard Electric Co., Warren, O..... R F .....
Parac. See Phillips Wire Co.
Paracore. See U. S. Rubber Co.
Paraflex. See Bishop Wire & Cable.
Paranite. See Indiana Rubber.
Parkerite. See Seward Wire Co.
Peco. See Packard Elec. Co.
Philadelphia Insulated Wire Co., 200 N. Third, Philadelphia, Pa..... H A T ..
Phillips Wire Co., Div. of General Cable Corp., Pawtucket, R. I..... R .....
Providence Insulated Wire Co., Providence R F H A ...
Pyroproof. See Hatfield Rubber Works, Inc.
Raven Core. See New York.
Reliance. See American Steel.
Revolute Wire Co., Hastings-on-Hudson, N. Y. ..... M
Rockbestos Products Corp., 369 Nicoll, New Haven, Conn. ..... R .. H .. T M
Roebling's Sons Co., John A., Trenton, N. J ..... R F H A T M
Rome Electrical Co., Inc., Div. of General Cable Corp., Rome, N. Y..... M
Rome Wire Co., Inc., Div. of General Cable Corp., Rome, N. Y..... R F H .. T M
Ross Wire Co., 69 Bath, Providence, R. I.. R .....
Romoxide. See Rome Wire Co.
Ruffcoat. See Rome Wire Co.
Runzel-Lenz Elec. Mfg. Co., 1751 N. Western Ave., Chicago, Ill..... T ..
Safety Cable Co. (Div. of General Cable Corp.), New York ..... R F H .....
Salamander. See York Insulated.
Seward Wire Co., Parkersburg, W. Va. R .....
Silkenamel. See Belden Mfg. Co.
Silkenite. See Acme Wire Co.
Simcore. See Simplex Wire.
Shield. See Ansonia Elec'l Co.
Simplex Wire & Cable Co., 201 Devonshire, Boston, Mass. ..... R F H .. T ..
Southern States Cable Co., Div. of General Cable Corp., Mobile, Ala..... M
Spiralweave See Hazard Ins. Wire
Standard Alloy Wire Co., Div. of National-Harris Wire Co., Newark, N. J. .. H .....
Standard Underground Cable Co., Pittsburgh, Pa. (Div. of General Cable.) R F H A T ..
Sterling. See Standard Underground.
Sterling Insulated Wire Co., Fall River, Mass. ..... R .....
Strand & Sweet Mfg. Co., Winsted, Conn. ..... M
Super-Service. See Rome Wire Co.
Sweetstrand. See Strand & Sweet.
Tip-Top. See Standard Underground.
Tirex See Simplex Wire & Cable.
Trenchlay. See Rome Wire Co.
Triangle Conduit Co., Dry Harbor Rd. & Cooper Ave., Brooklyn..... R .....
Tubular Woven Fabric Co., Pawtucket, R. I. ..... R F .....
United States Rubber Co., 1790 Broadway New York, N. Y..... R .. H A T .
U. S. Royal. See United States.
Varflex Corp., Rome, N. Y..... M
Warrior. See American Copper.
Wheeler Insulated Wire Co., Bridgeport, Conn. ..... R F H .. T M
White, J. M., 1128 Oliver, Philadelphia, Pa. ..... R F H .. T .

Whitney Blake Co. See Graybar Electric Co.
Wovenite. See Flexible Woven.
York Insulated Wire Wks. of G. E. Co., 120 Broadway, New York, N. Y..... R .. H .... M

WIRE MANUFACTURING MACHINES

(See Also Wire Drawing Machines; Insulation Mixers; Taping Machines, Wire; Wire Polishing Machines; Enameling Machines for Magnet Wire; Wire Wrapping Machines; Vulcanizers, Wire Insulation.)

Armoring Machines .....See A
Braiding Machines .....See B
Bunching Machines .....See S
Covering Machines .....See I
Insulating Machines .....See I
Insulation Straining Machines.....See I
Measuring Machines .....See M
Park Cabling Machines.....See A
Saturating Tanks .....See F
Spooling Machines .....See U
Stranding Machines .....See S
Tinning Tanks .....See F
Winding Reels .....See U

Adamson Machine Co., Akron, Ohio.. I A .....
Almco-Seward. See American Insulating Machinery Co.
American Insulating Machinery Co., 519 Huntington Ave., Philadelphia, Pa. I A .... S U F
Breguet. See American Insulating
Crescent. See Royle & Sons, John.
Durant Mfg. Co., 662 Buffum, Milwaukee, Wis. ..... M .. U ..
Fidelity Machine Co., 3908 Frankford Ave., Philadelphia, Pa. ..... B .....
Housatonic Machine & Tool Co., Bridgeport, Conn. ..... I ..... U ..
Minneapolis Elec. & Construction Co., 80 S. 12th St., Minneapolis, Minn. ..... M .. U ..
Nebutteo. See New England Butt Co.
New England Butt Co., 324 Pearl, Providence, R. I. ..... I A B M S U ..
Peerless. See Royle & Sons, John.
Robertson Co., John, 121 Water, Brooklyn, N. Y. ..... A .....
Royle & Sons, John, Paterson, N. J. I .....
Sleeper & Hartley, Inc., Worcester, Mass. ..... A .... S U
Terkelsen Machine Co., Terkelsen Bldg., Boston, Mass. ..... M .....
Textile Machine Works, Reading, Pa. .... B .....
Universal Wire Machy. Co., 69 Daggett, New Haven, Conn.. ..... A ..... U F
Utility Mfg. Co., Cudahy, Wis..... I .....
Wardwell Braiding Machine Co., Central Falls, R. I. ..... B .....
Watson Machine Co., 74 Railroad Ave., Paterson, N. J. .. .. I .....
Wire Machinery Corp. of Am., New Haven, Conn. ..... M S U ..
Weir. See Housatonic Machine

WIRE POLISHING MACHINES

(See Also Wire Manufacturing Machines).
American Insulating Machinery Co., 519 Huntington Ave. Philadelphia, Pa.
New England Butt Co., 324 Pearl, Providence, R. I.

WIRE, Steel Flat

Steel Coating for Armored Conductor.
American Steel & Wire Co., 208 S. La Salle, Chicago, Ill.
Crescent Insulated Wire & Cable Co., Trenton, N. J.
Roebling's Sons Co., John A., Trenton, N. J.
Seneca Wire & Mfg. Co., Fostoria, O.

WIRE STRAIGHTENING MACHINES

Eisler Electric Corp., 770 S. 13th St., Newark, N. J.
Franklin Mfg. Co., New Haven, Conn.
Kane & Roach, Syracuse, N. Y.
Shuster Co., F. B., New Haven, Conn.
Seifert, E. R., 315 E. Washington, Syracuse, N. Y.

WIRE TAPING MACHINES. See Taping Machines, Wire

WIRE VULCANIZING MACHINES. See Vulcanizers

WIRE WRAPPING MACHINES

Terkelsen Machine Co., Terkelsen Bldg., Boston, Mass.

WOOD BLOCKS. See Cabinets & Boxes, Wood.
Boxes. See Cabinets & Boxes, Wood
Cabinets. See Cabinets & Boxes, Wood
Pulleys. See Pulleys, Composition Wood& Metal. See Radio Mountings.

WRAPPERS, Paper. See Boxes and Wrappers.

WRAPPERS, Tungsten Lamp. See Boxes and Wrappers.

YARN AND THREAD: Silk, Cotton, Asbestos

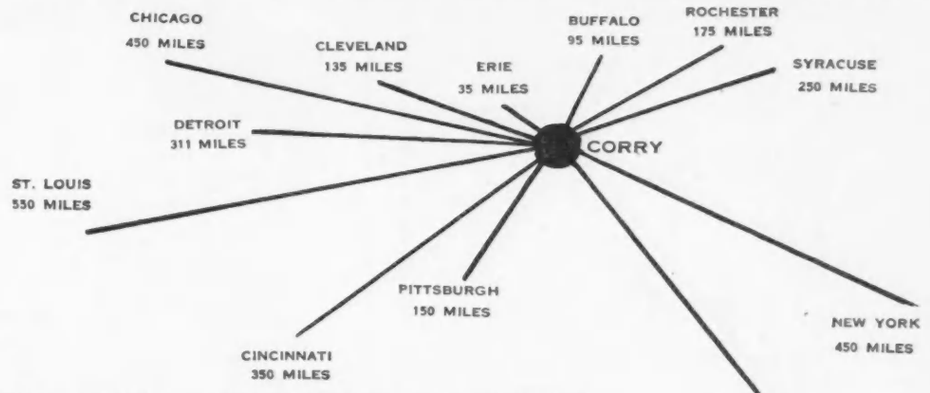
Allbestos Corp., 21st & Godfrey Ave. (Germantown), Philadelphia, Pa.
Ambler Asbestos Shingle & Sheathing Co., Ambler, Pa.
American Asbestos Co., Norristown, Pa.
American Glanzstopf Corp., 180 Madison Ave., New York.
Anchor Thread Co., Trenton (Groversville), N. J.
Asbestos Fibre Spinning Co., North Wales, Pa.
Columbian Rope Co., Auburn, N. Y.
Commercial Rayon & Thread Co., 19 W. 21st, New York.
Fawcett, Inc., Hughes, 115 Franklin, New York, N. Y.
Ferodo & Asbestos, Inc., New Brunswick, N. J.
Florsheim, H. A., 225 Fifth Ave., New York, N. Y.
Franklin Rayon Corp., 86 Crary, Providence, R. I.
General Electric Co., Schenectady, N. Y.
Great Lakes Yarn & Thread Co., Div. of General Cable Corp., 5133 Wesson Ave., Detroit, Mich.
Johns-Manville Corp., New York, N. Y. (Asbestos.)
Kubar Mfg. Co., Davidson, N. C.
Lees Mfg. Co., 320 Broadway, New York, N. Y.
Multiple Winding Co., 77 Summer, Boston, Mass.
Rich & Co., H. S., 180 S. Water, Providence, R. I.
Ryle & Co., Wm., 381 Fourth Ave., New York, N. Y.
Silkslip. See Worcester Bleach & Dye Wks. Co.
Smith & Dove Mfg. Co., Andover, Mass. (Linen Thread.)
Worcester Bleach & Dye Wks., Worcester, Mass.

ZINC

Bunker Hill. See St. Joseph Lead Co.
Horse Head. See New Jersey Zinc Co.
New Jersey Zinc Co., 160 Front, New York, N. Y.
Platt Bros. & Co., Waterbury, Conn. (Strips.)
St. Joseph Lead Co., 250 Park Ave., New York, N. Y.
United Metals Selling Co., 25 Broadway, New York, N. Y.

ZINCS AND COPPERS, Battery

Bunker Hill. See St. Joseph Lead Co.
Bunnell & Co., J. H., 32 Park Pl., New York, N. Y.
Edes Mfg. Co., Plymouth, Mass.
Extruded Metal Corp., 184 53rd, Brooklyn, N.Y. (Zinc Cups.)
Franklin. See Grasselli Chemical Co.
Grasselli Chemical Co., Guardian Bldg., Cleveland, O.
Illinois Zinc Co., Peru, Ill.
Lind Mfg. Co 70 Wyckoff Ave., Brooklyn, N.Y. (Zinc Cups.)
Mattiessen & Hegeles Zinc Co., La Salle, Ill.
New Jersey Zinc Co., 160 Front, New York, N. Y.
St. Joseph Lead Co., 250 Park Ave., New York, N. Y.



LOCATED FOR SERVICE

Within quick reaching distance of every manufacturer of electrical equipment or household convenience

EQUIPPED FOR SERVICE

With new and speedy automatic machinery especially adapted to the needs of the electrical industry

Why not send us your inquiries for--

Flat Springs

Coil Springs

Wire Forms Small Stampings

RAYMOND MFG. CO.
CORRY, PA.

For Better Washers

ACTUAL SIZE

OF BRASS, STEEL AND COPPER
Highest quality—Low prices
Write Us

MASS. MACHINE SHOP, INC.
BOSTON, MASS.

SOLDER YOUR COMMUTATORS

With the

"ALLATONCE"

Commutator Soldering Machine at

50 to 600 Per Hour

Perfect Joints — No Injury to Insulation or Shafts—No Wasted Solder.

P. E. Chapman Elec. Works
1820 Chouteau Ave., St. Louis, Mo.
Makers of Armature Winding Machines

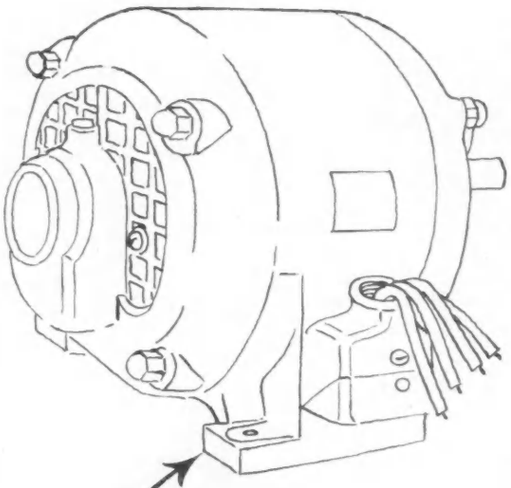
The importance of small parts

. . . cannot be gauged indifferently. Especially in Blake & Johnson screw machine products does accuracy and uniformity play their important roles, as efficiently as the electrical products of which they become a part.

Blake & Johnson feel that, with eighty-one years' experience, they are exceptionally well equipped to furnish any type of screw machine product made to ordinary or most exacting specifications. Try us on a difficult assignment.

The Blake & Johnson Co.

1497 Thomaston Ave.
Waterville, Conn.
SINCE 1849



HOBBS

for MOTOR MOUNTING

It is on such jobs that Hobbs Lock Washers prove their out-of-the-ordinary quality. A Hobbs-locked bolt isn't going to loosen—the carefully tempered drawn steel takes care of that.

There are hundreds of other applications wherein Hobbs Lock Washers will serve dependably. May we submit quotations together with samples?

We are also equipped to make for electrical manufacturers lock washers of unusual dimensions. However, in the Hobbs Catalog No. 13 will be found lock washers that meet most existing needs.

Hobbs Manufacturing Co.
WORCESTER, MASSACHUSETTS
Not Members of Any Combine

Pick the right grade of
PHOSPHOR BRONZE
for the job
with the aid of this book

. . . Send for it

This helpful book gives you the uses and specifications of our various grades of Phosphor Bronze.

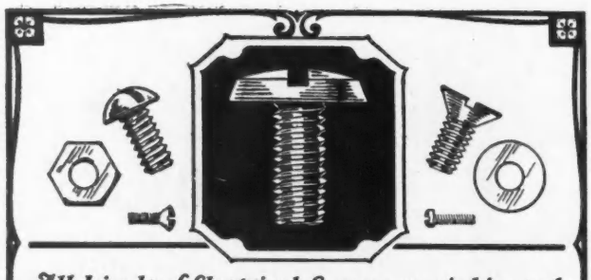
There is a special grade of ELEPHANT BRAND Phosphor Bronze for every electrical requirement. Picking the right one means dollars saved. The elements in this Phosphor Bronze are absolutely pure—that's why it wears.

ELEPHANT BRAND Phosphor Bronze can be obtained in ingots, rods, castings, tubes, sheets, wire, or rope. Our "S" Bearing Metal is flawless and resists friction.

ELEPHANT - BRAND -

THE PHOSPHOR BRONZE SMELTING CO.
2200 Washington Ave. Philadelphia, Pa.

Rome Electrical Company, Inc.
Manufacturers of
Twin, Round, Flat and Square
MAGNET WIRES
Cotton, Silk, Asbestos, Paper and Enamel Covered
Write for Prices
ROME NEW YORK



All kinds of Electrical Screws carried in stock
WRITE FOR PRICES
NEW ENGLAND SCREW CO.
DEPT. A
44 FARNSWORTH ST. BOSTON, MASS.

Take advantage of the low price of PLATINUM

Not since 1915 has the price of PLATINUM been as low as it is today. This means that electrical manufacturers can now employ the advantages of PLATINUM in contact point applications at a material saving in costs.

The Wilco organization will gladly work with you on any contact point problem and, if you are now using tungsten, silver or alloys in contact points wherein PLATINUM would be desirable, tell us, and we'll send quotations.

WILCO

Platinum Contact Points

THE H. A. WILSON CO., NEWARK, N. J.

Refiners and Workers of Platinum, Silver and Other Precious Metals

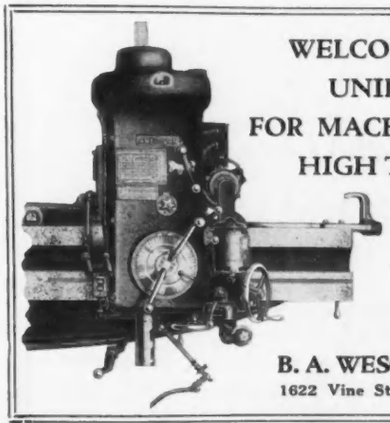
Chicago Office—5 S. Wabash Ave.

PARAGON DIE CASTINGS

ALUMINUM—ZINC—TIN and LEAD BASE

A new plant, new equipment, but old, ripe experience behind every detail of our specialized work. Let us submit quotations—our advice will not obligate you.

Paragon Die Casting Co.
2701 N. Crawford Ave.
Chicago



WELCO MOTORS
UNIFRAME
FOR MACHINE TOOLS
HIGH TORQUE,
TRAVERSE,
CLAMP
DUTY OUR
SPECIALTY.

B. A. WESCHE ELEC. CO.
1622 Vine St., Cincinnati, Ohio

We wish to correct

An Error

In the April issue of ELECTRICAL MANUFACTURING our advertisement incorporated the statement, "we can meet any condition of price."

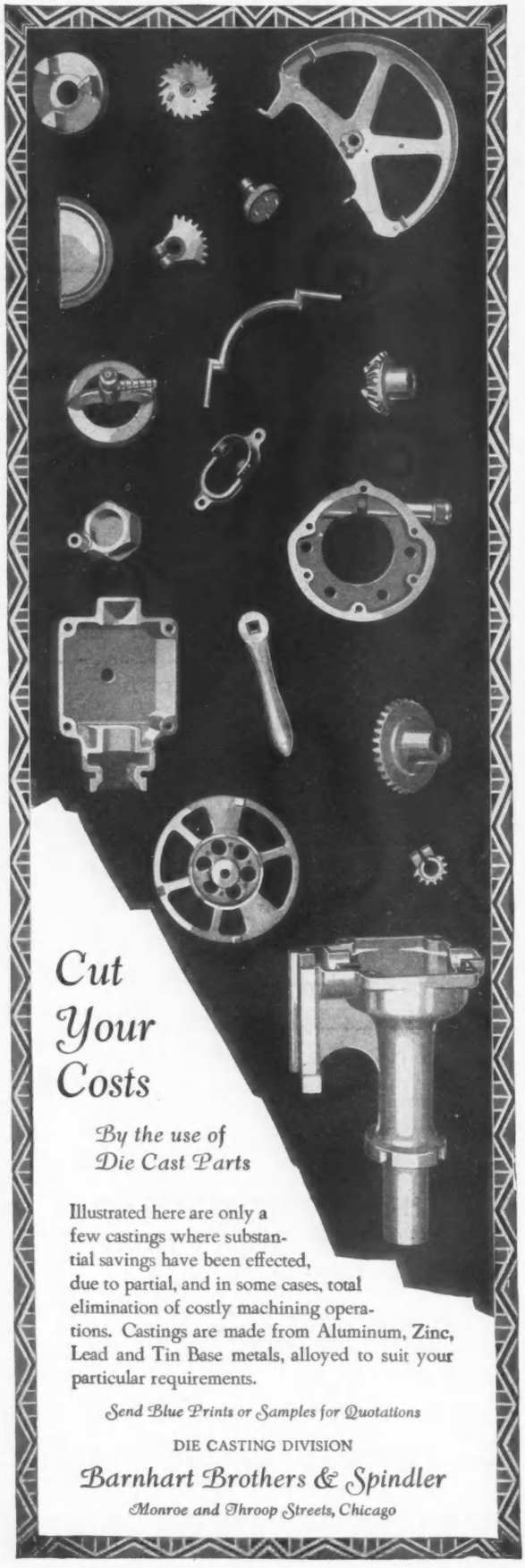
That was an erroneous statement we wish to retract—*we do not cut prices nor solicit business on the basis of price.*

We do, however, do business under this standard—QUALITY, inimitable SERVICE and PRICE that represents dollar-for-dollar value.

FAIRMONT ALUMINUM CO.
ALUMINUM ROLLING MILLS
Fairmont, W. Va.

Branch Sales Offices
New York: 52 Vanderbilt Avenue
Chicago: Monadnock Block
Detroit: General Motors Building

Warehouse Distributors
Central Steel and Wire Company, Chicago
Sueske Brass & Copper Co., Chicago
Chas. A. Sterlinger Co., Detroit
J. M. & L. A. Osborn Co., Cleveland
Ducommum Corporation, Los Angeles and San Francisco



Cut Your Costs

By the use of Die Cast Parts

Illustrated here are only a few castings where substantial savings have been effected, due to partial, and in some cases, total elimination of costly machining operations. Castings are made from Aluminum, Zinc, Lead and Tin Base metals, alloyed to suit your particular requirements.

Send Blue Prints or Samples for Quotations

DIE CASTING DIVISION

Barnhart Brothers & Spindler

Monroe and Throop Streets, Chicago

ZELLAC

BLACK LACQUERS

Special Zeller-made Blacks for electrical and metal-finishing requirements have long been famed for their fitness to meet every known need. Zellac Blacks for electrical equipment possess high dielectric strength—extraordinary adhesion and flexibility—supreme toughness and durability. Beauty of finish is inherent in all these Blacks as in all other Zellac grades. Their excellent quality is demonstrated by their unrivalled production advantages — greater building, hiding and covering properties—the kind of economy that is necessary in well-finished products that SELL! Whether for switchboard, insulation or other work, in either dip or spray grades, or in grades intended for other fields of lacquer finishing, the wide range of Zellac Blacks are the standard among many leading users. The glossy Black Lacquer Enamels, produced to meet Navy specifications, are particularly successful on such products as metal flashlight tubes. Outstanding Blacks are supplied for every conceivable industrial purpose, including grades for flat, rubber, satin and high gloss finishes. Advise us of your requirements, and let us give you the benefit of two generations of Zeller service.

ZELLER LACQUER MFG. CO., Inc.

20 East 49th Street New York City

CHICAGO WICHITA
LOS ANGELES DENVER SAN FRANCISCO
PORTLAND SEATTLE

ZELLER

A New Binding Post You Can Manufacture

on a license royalty basis. Covered by U. S. and Canadian patents.

Insulated. No holes to fish for. Insert wire in any position. Quick action. Holds tight.

J. L. POLK, *Patentee*
41 Belle Avenue Troy, N. Y.

SEAMLESS TUBING

Copper, Brass, Aluminum

Dehydrated Copper Tubing

Soldering Lugs
Connectors

WOLVERINE TUBE CO.

SEAMLESS COPPER BRASS & ALUMINUM

1431 Central Ave. Detroit, Mich.

ELECTRITE

A high grade fibre board for electrical insulation.

A material of quality possessing high tensile and dielectric strength.

Tested and approved by the Underwriters' Laboratories.

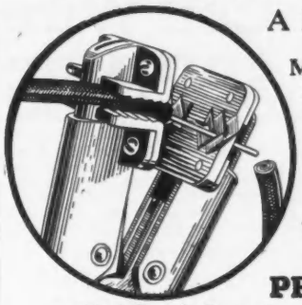
Pulp Products Department

WEST VIRGINIA PULP & PAPER COMPANY

230 Park Avenue, New York, N. Y.
35 East Wacker Drive, Chicago, Ill.

E-Z WIRE STRIPPER

A HANDY TOOL *for all* MANUFACTURERS

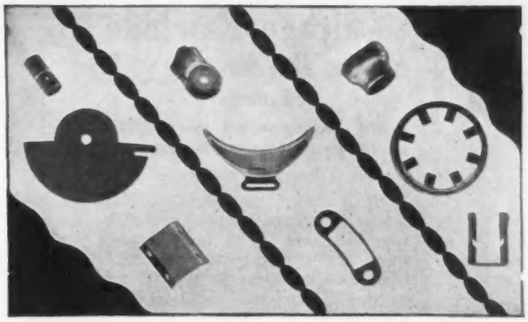


Here is a tool that will save you time and money, speed up production and lower your costs.

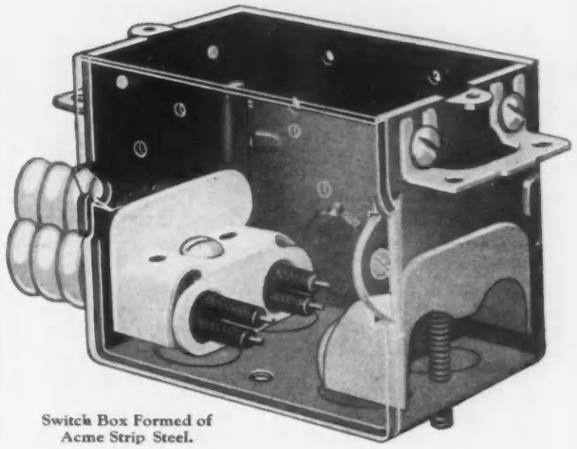
This inexpensive tool strips wire of 10 to 20 gauge 20 times faster than usual methods. Give it a trial on a money back guarantee. Thousands in use.

PYRAMID PRODUCTS CO.
2311 South State St., Chicago, U. S. A.

Small Metal Stampings Accurately Made



PATTON-MacGUYER CO. — Providence, R. I.



Switch Box Formed of Acme Strip Steel.

ACME STRIP STEEL

for

Electrical Manufacturing

A full range of sizes in hot and cold rolled strip steel, all tempers and finishes including Electro-Galvanized. Furnished in long length coils or cut lengths for stamping, forming and deep drawing....The Acme Mills are geared to supply the largest users, and flexible enough to take care of the needs of the small buyer. Let us quote on your requirements.

SAVE WITH STEEL

1880 **ACME STEEL COMPANY** 1930
OUR GOLDEN ANNIVERSARY
Hot and Cold Rolled Strip Steel

General Offices:
2832 Archer Avenue . . Chicago

ATLANTA
BROOKLYN
DETROIT
MILWAUKEE
LOS ANGELES
SAN FRANCISCO
SEATTLE
MONTREAL

26

TIREX
PORTABLE CORD

For drills, grinders and other portables

To give the service it is capable of giving, a good portable electric tool or piece of apparatus should be serviced with a portable cord that will parallel the performance of the equipment to which it is attached.

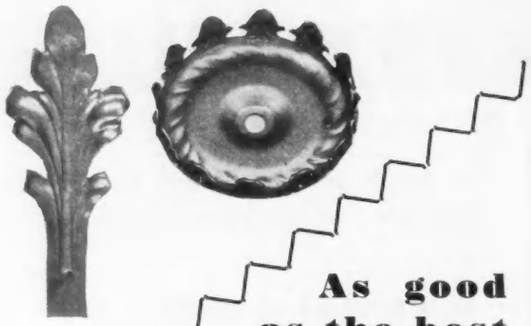
TIREX is a flexible, rubber-sheathed cord made specially for portable electric tools and equipment. By keeping portables in smooth running order it speeds up production and at the same time reduces cord maintenance costs.

The outer covering of TIREX Portable Cord is a sheath of carefully compounded "selenium rubber," an exclusive feature. The "selenium rubber" sheath will retain its flexibility, toughness and wear-resisting qualities indefinitely.

There is a type and size of TIREX to meet every condition of cord service. Write for a sample, full details and prices.

TIREX is packed in convenient cartons containing approximately 250 feet each, (from 200 to 270 feet) so constructed that any desired length may be removed without disturbing the remainder of the coil. Other lengths may be obtained in coils or on reels.

SIMPLEX WIRE & CABLE Co
MANUFACTURERS
201 DEVONSHIRE ST., BOSTON
BRANCH SALES OFFICES
CHICAGO, 564 W. Monroe St. SAN FRANCISCO, 390 Fourth St.
NEW YORK, 1328 B'way CLEVELAND, 2019 Union Trust Bldg.
PHILADELPHIA, 1227 Fidelity-Philadelphia Trust Building
JACKSONVILLE, 1010 Barnett National Bank Building



As good as the best lighting fixtures

MELAUN Lighting Fixture Ornaments are designed to enrich and not detract from the fundamental design of good lighting fixtures. Because of our large equipment of tools and dies we are prepared to manufacture and ship, quickly, any type of metal stamping.

Electrical manufacturers are taking advantage of our excellent shipping location and low overhead.

We not only make lighting fixture ornaments but metal stampings, as well, in any type or shape you may specify. Avail yourself of our metal stamping knowledge by placing your problem before us.

Write today for catalog 25-A showing stock wrought iron ornaments.

MELAUN MANUFACTURING CO.
144-146 East Morris St.
INDIANAPOLIS, IND.

Coil Wire SPRINGS

For all electrical and mechanical manufacturing purposes. All specifications as to quantity and quality are accurately met. Our prices are right and delivery prompt.

Write for Catalog

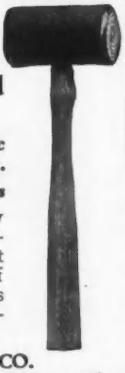
ADVANCE SPRING & WIRE COMPANY
Carroll Ave. and Wood St.
Chicago, Illinois

Chicago Rawhide
Mallets and Rawhide-Faced Hammers

Used extensively in electric motor assembly and repair work.

Saves Battered-Up Motor Parts

Will transmit an effective blow without damage to the most delicate surface. The blow is not more destructive to the tool itself than to the object to which it is applied—therefore, doubly economical.



THE CHICAGO RAWHIDE MFG. CO.
1287 Elston Ave., Chicago, Ill.

The
right Spring
costs no
more

DEPENDABILITY of springs as a part of your product is of more importance to you than initial cost. All things considered, when a spring is essential to the operation of any device the best is the cheapest, regardless of first cost.

GIBSON-SPRINGS

COMPRESSION EXTENSION
TORSION FLAT
ANY MATERIAL OR QUANTITY
ANY STYLE OR SIZE
ALSO LIGHT STAMPINGS

WM. D. GIBSON CO.
1800 CLYBOURN AVE.
CHICAGO
ILL.

UNIVERSAL
Automatic Coil Winding Machinery

LEESONA

UNIVERSAL coil winders have been designed and developed by an organization specializing in winding machinery since 1892. Six distinct types of machines are available—to produce any required type of coil, spool-wound or self-supporting, cotton or paper insulated. Entirely adjustable for various sizes of coils, these machines never become obsolete. The many special features and automatic controls insure precision-wound coils at lowest possible cost.

UNIVERSAL WINDING COMPANY
BOSTON

Manufacturers of coil winding equipment covering practically every phase of the electrical industry

Experienced Management Executive

Available to Progressive Manufacturer

University graduate with fourteen years experience, the past eight years with manufacturer in ELECTRICAL and automotive industries, is available for management position with aggressive company.

This man has exceptionally well-rounded executive experience, covering production, sales and finance. Has record of accomplishments in each of these major departments, and general management ability demonstrated by results produced in organization and co-ordination.

An aggressive manufacturer will capitalize the ability of this man by offering a connection affording scope for his capabilities.

Address Box "A"
c/o Electrical Manufacturing
731 Monadnock Block, Chicago, Ill.

Ready to Use
Needs only Heat

EXACT

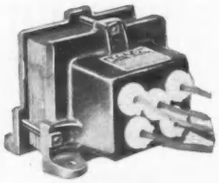
No more soldering failures—Kester eliminates the guesswork of separate fluxes. Its simple, sure operation will speed your work. Increase your soldering efficiency with Kester Flux-Core Solders.

Let our experts analyze your specific needs and recommend a special solder, designed for your particular purposes. Consultation imposes no obligation; write our research department today.

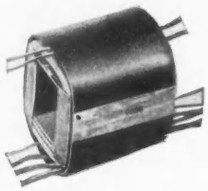
KESTER SOLDER COMPANY
4210 Wrightwood Ave., Chicago, Illinois
Incorporated 1899—Formerly Chicago Solder Co.

KESTER FLUX-CORE SOLDER

ACID-CORE ROSIN-CORE PASTE-CORE
METAL MENDER RADIO SOLDER



TRANSFORMERS
1 to 10 KVA air cooled
Completely enclosed or open-end frame mounting



COILS
of all types
Machine wound
Vacuum impregnated

KENYON TRANSFORMER CO., Inc.
122 Cypress Ave., New York

"Candy's Faultless"
(True to name)
WAXES
INSULATING MATERIALS

for Rubber Covered and Weatherproof Wire, Coils, Condensers, Conduit, Wet and Dry Batteries, Wiring Devices, Sockets, Switchboards, etc. MATERIALS TO YOUR OWN SPECIFICATIONS OUR SPECIALTY. Compounds for Radio Parts.

35 Years' Experience in Compounding

CANDY & COMPANY, Inc.
35th and Maplewood Ave., Chicago, Ill.

MULLINS
FOR STAMPINGS

Quality, Service and Price

Automotive and General Stampings—Washing Machine Tubs—Bases—Legs—Gear Housings—Belt Guards—Lids—Gasoline Pump Parts, etc.

Mullins Manufacturing Corp.
Main Office and Works: Salem, Ohio
In Cleveland and Pittsburgh District
BRANCH OFFICE 332 So. Michigan Ave., Chicago
" " 7-252 General Motors Bldg., Detroit

BEAD CHAIN *for* ELECTRIC FIXTURES

Dependability

From the standpoint of quality, uniformity, and prompt delivery, dependability has made Bead Chain the standard of the industry.

THE BEAD CHAIN MANUFACTURING CO.
BRIDGEPORT · CONNECTICUT

Albert Lorsch & Co., Inc., Sales Agents
607 Fifth Avenue
New York City

CASE BROTHERS
INCORPORATED

Highland Park, Conn.

Manufacturers of

Insulating Papers and Boards

Press Boards

Fuller Boards

M-R INSULATION M'F'G CO

"Everything in Insulation"

Compounds, Waxes and Paints
Varnishes and Varnished Materials
Insulating, Waterproofing and Maintenance Paints

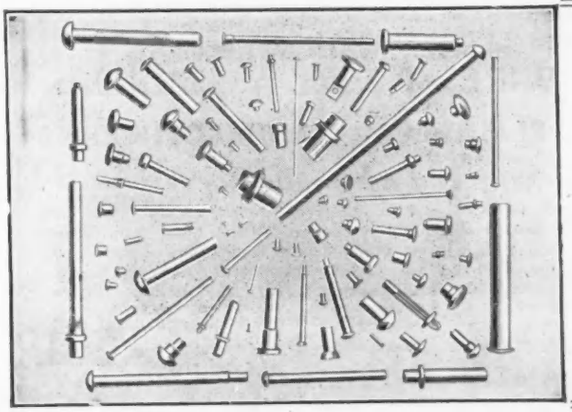
Mitchell-Rand Mfg. Co., 19 Vesey St., N. Y.

Quick Service on SCREW MACHINE PRODUCTS

—accuracy, too, on anything made of from 1/16" to 1-5/8" round or from 1/8" to 1-1/2" hex. stock—to specifications. Send samples or blueprints.

D. M. WATKINS COMPANY
270 Pine St. Providence, R. I.

Since 1895



WHEN IN NEED OF

MACHINE SCREWS
MACHINE SCREW NUTS
SPECIAL STUDS
SPECIAL SCREWS

COMMUNICATE WITH
THE HOUSE OF SERVICE

THE PROGRESSIVE MANUFACTURING CO.
TORRINGTON, CONN.

We please those discriminating manufacturers who not only demand quality but service as well. Business goes where it is invited and remains where it is well treated. The illustration reveals a few only of the possibilities that are developed by the cold heading process.

IN THE LONG RUN —it's the quality that counts

. . . . because quality is a by-word in the Thomaston plant, accomplished by up-to-the-minute equipment, supreme accuracy and honest materials.

We specialize in screw machine products of brass and steel, small universal joints, etc., and we constantly cooperate with the molding trade in supplying metal inserts in a myriad of shapes and sizes. Our clients remain with us because they obtain satisfaction and lower prices, resulting from our low overhead. Let us quote from your blueprints or samples.

THOMASTON MFG. CORP.
Thomaston, Conn.

Good Factory Site Available

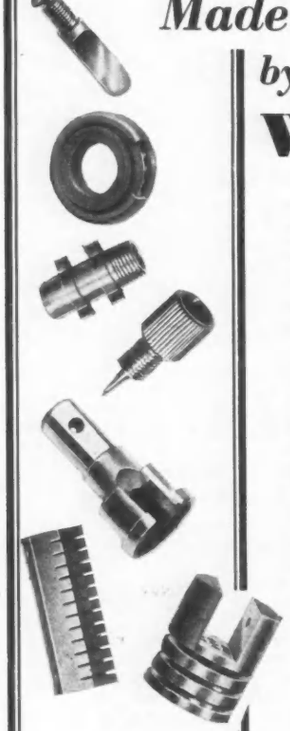
Located within 25 miles of Albany and 17 miles of Schenectady.

Labor conditions favorable with several small villages and farming community to draw upon.

Water supply good.

Village board will cooperate with financially responsible manufacturers.

For further information address L. L. D., care of Electrical Record, Box 72.



Made **RIGHT** *by* **WRIGHT**

In all metals and alloys, WRIGHT makes screw machine products in amazing numbers and in all sizes up to 3-in. diameter.

We wish to lay particular emphasis on the fact that QUALITY is paramount in every piece we turn out.

Let us estimate from your samples or blue print.

WRIGHT MACHINE COMPANY
79 Armory Street
WORCESTER MASS.

CHACE THERMOSTATIC METAL
"It Bends With the Heat"

An accurate, consistent and durable bi-metal for temperature responsive devices up to 1500° F. Mill sheets or finished form. Consult our Eng. Dept.

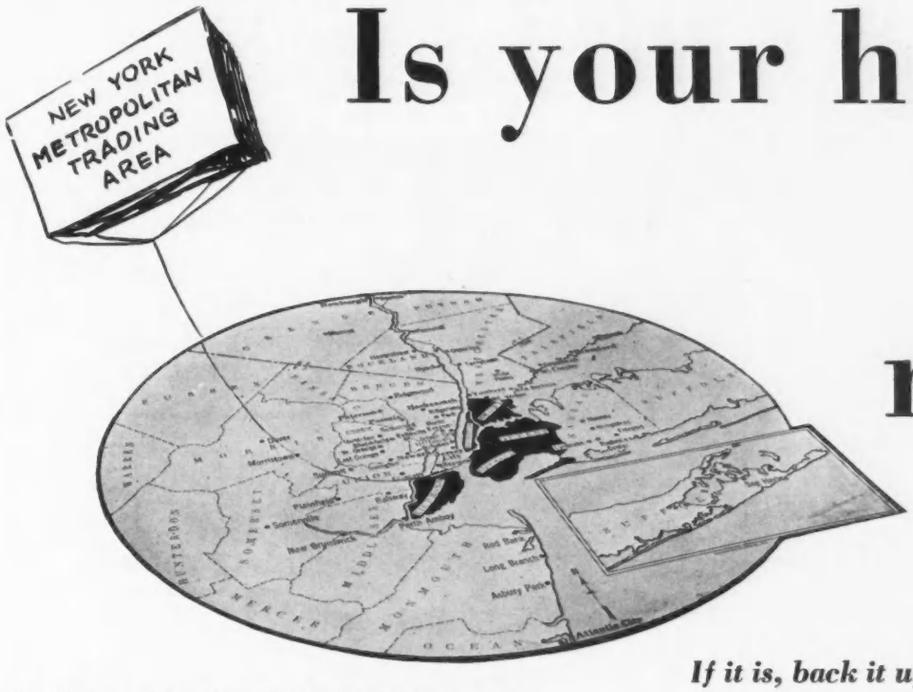
Manufactured by
W. M. CHACE VALVE COMPANY
1608 BEARD AVE. - DETROIT, MICH.

INSULATED WIRE AND WIRE ASSEMBLIES FOR ELECTRICAL MANUFACTURERS

Wire and Assemblies for { AUTOS RADIO AIRPLANE

Cords, Cables, Rubber-covered Wire, Lead Wire, Electrical Harnesses, Braided and Stranded Copper Wire, Tinsel Cords, Special Instrument and Appliance Cords, Cotton Sleeving, Terminal Work and Bakelite Plugs.

Prompt and Efficient Service
Send Us Your Inquiries
AMERICAN BRAIDING COMPANY
Holyoke, Mass.



Is your hat in this ring?

If it is, back it up with the most helpful selling support you can give your wholesaler

The Metropolitan New York Trading Area contains in its 50-mile radius the world's most concentrated electrical market, served by its own electrical *news* paper,—METROPOLITAN ELECTRICAL NEWS.

Wholesalers trying to move your goods in this competitive market need your support to do a worthwhile job for you. Their customers,—the men who tell them what they want—read METROPOLITAN ELECTRICAL NEWS, down to the last man. It's their paper—it gives them the local, personal, trade news they want, encourages their activities, talks their lingo.

"MET NEWS" is known and respected by every electrical factor in this area, and they get their buying information from its pages. A message about your product in this breezy, pocket-size paper gets the attention that nothing but a personal interview can beat.

Follow your hat into this New York ring with a few hefty selling punches in METROPOLITAN ELECTRICAL NEWS, and watch the effect on your wholesaler. The circulation monthly of 6500 covers every Contractor, Contractor-Dealer, Dealer, Central Station and Wholesaler in this great trading area.

THE GAGE PUBLISHING CO., INC.
461 Eighth Avenue, New York, N. Y.
Publishers in the Electrical Industry Since 1892

Metropolitan Electrical News

[A GAGE PUBLICATION]

Advertisers

Acme Electric & Mfg. Co. 131
Acme Steel Co. 137
Advance Spring & Wire Co. 138
Aetna Ball Bearing Mfg. Co. 113
Aga Auto Lamp Co., Inc. 123
Akron Porcelain Company, The 107
Allen Co., Inc., L. B. 120
Aluminum Co. of America 16
Ambler Asbestos Shingle & Sheathing Co. 77
American Braiding Co. 142
American Insulator Corporation 144
American Lava Corporation 103
American Record Corp. 19
Angle Steel Stool Co. 119

Bakelite Corporation 17
Baker & Company, Inc. 112
Baldor Electric Co. 22
Barnes Co., The Wallace 127
Barnes-Gibson-Raymond, Inc. 123
Barnhart Brothers & Spindler 136
Baumbach Mfg. Co., E. A. 131
Bead Chain Mfg. Company, The 141
Beckwith Machine Company 18
Belden Mfg. Company . . Inside Front Cover
Biddle, James G. 104
Blake & Johnson Co., The 133
Boonton Moulding Co. 106
Boonton Rubber Mfg. Co. 95
Brand & Company, William 131
Brandywine Fibre Products Co. 101
Brawley Felt Co., Inc., T. R. 105
Brevolite Lacquer Co. 110
Burgess & Company 107

Cameron Elec'l Mfg. Co., The 115
Candy & Company, Inc. 140
Case Brothers, Inc. 141
Century Electrical Co. 104
Chace Valve Co., W. M. 126, 142
Chandler Company, The 108
Chapman Elec'l Works, P. E. 133
Chapman Machine Co., The 122
Chicago Moulded Products Corp. 99
Chicago Rawhide Mfg. Co., The 138
Cochrane Chemical Co. 130
Colonial Insulator Company 103
Conran, Fredk. M. 130
Consumers Rubber Co., The 100
Continental-Diamond Fibre Co. 25
Cook Pottery Company 104, 106, 112
Cooke Seal Ring Co. 109

Davis Slate & Mfg. Company 120
De Jur-Amsco Corp. 119
Delbee Rubber Co. 101
Diemolding Corp. 108
Dolph Company, John C. 110
Driver-Harris Co. 111
Dudlo Manufacturing Co. 6-7
Dumore Company, The 21
Dunn, Inc., Struthers 92, 125

Easton Coil Co. 79
Egyptian Lacquer Mfg. Co., The 20
Elco Tool & Screw Corp. 131
Electric Valve Mfg. Company 100
Electrical Refractories Co., The 107
Electrical Specifications 10b
Electrical Testing Labs. 111
Electro Dynamic Co. 111
Eureka Metal Products Corp. 117

Fair Haven Marble & Marbleized Slate Co. 120
Fairmont Aluminum Co. 135
Fansteel Products Co., Inc. 127
Farquhar Co., Ltd., A. B. 96
Federal Bearings Co., Inc., The 87
Fischer Spring Co., Chas., The ..122, 128
Formica Insulation Co., The 4
France Mfg. Co., The 131
Franklin Die Casting Corp. 96

Gage Publishing Co., Inc., The 10b, 143
Garfield Mfg. Company 106
General Electric Co. 24, 26, 75
General Etching & Mfg. Co. 108
General Plastics, Inc. 15
George Co., P. D. 113
Gibson Co., Wm. D. 139
Gilby Wire Company 130
Gits Bros. Mfg. Co. 139
Globar Corp. 8
Gurney Ball Bearing Division (Marlin-Rockwell Corp.) 85

Handy & Harman 117
Hardwick, Hindle, Inc. 115
Hassall, Inc., John 121
Hatfield Rubber Works, Inc. 10a
Hinde & Dauch Paper Co., The 9
Hobbs Mfg. Co. 134
Hunter Pressed Steel Co. 122

Ilsco Copper Tube & Products, Inc. 127
Impervious Varnish Co. 110
Information Wanted 105
International Insulating Division, The General Industries Co. 12
Insuline Corp. of America 93
Interstate Products Corp. 123

Kendrick & Davis Co. 117
Kennedy Car Liner & Bag Co., The .. 99
Kenyon Transformer Co., Inc. 140
Kester Solder Co. 140
Kuhn & Jacob Machine & Tool Co. 105

Lee Spring Co., Inc. 122
Leland Electric Co., The 113
Linden & Company 118
Lowell Insulated Wire Co. 127

Maas & Waldstein Co. 105
Marlin-Rockwell Corp. 85
Mass. Machine Shop, Inc. 133
Master Electric Co., The 3
Mattatuck Mfg. Co., The 131
Melaun Co. 138
Mercer Porcelain Co., Inc. 112
Metropolitan Electrical News 143
Mica Insulator Company 91
Milwaukee Die Casting Co. 71
Mitchell-Rand Mfg. Co. 141
Mullins Mfg. Corp. 140
Munsell & Co., Eugene 97

National Electric Controller Co. 115
National Harris Wire Company 125
National Vulcanized Fibre Co. 67, 95
New Departure Mfg. Company, The ... 83
New England Screw Co. 134
New Jersey Zinc Co., The ..... Back Cover
Newton Die Casting Corp., The 69
New Yorker Hotel, The 129
Nolu Oilless Bearing Co. 92
Norma-Hoffmann Bearings Corp. ..... Front Cover
Norton Laboratories, Inc. 109

Ohio Elec. Mfg. Co., The 111
Ohmite Mfg. Co. 121
Olson Mfg. Company 118

Paragon Die Casting Co. 135
Parent Machine & Screw Co. 118
Parker-Kalon Corp. ..... Inside Back Cover
Patton-MacGuyer Co. 137
Peck Spring Co., The 121
Penn-Union Elec. Corp. 126
Phosphor Bronze Smelting Co., The .. 134
Platt Bros. & Co., The 139
Polk, J. L. 136
Portland-Monson Slate Co. 120
Power Transformer Co. 128
Progressive Manufacturing Co., The ... 141
Pyramid Products Co. 137

Raymond Mfg. Co. 133
Riegel Paper Corp. 101
Robertson-Davis Co. 98
Rogers Fibre Co. 95
Rome Electrical Company, Inc. 134
Rubicon Co. 125
Ruby Chemical Co., The 120
Russell Electric Co. 104

Sargent, Lester L. 110
Schmidt, Inc., Geo. T. 139
Sevison Magneto Engineering Co. 98
Shakeproof Lock Washer Company 13
Shaw Insulator Company 106
Signal Elec. Mfg. Co. 115
Simplex Wire & Cable Co. 138
Spaulding Fibre Co., Inc. 23
Standard Steel & Bearings, Inc. 89
Star Porcelain Company, The 109
Steinen & Company, William 118
Stewart Die Casting Corp., The 73
Sticht & Co., Herman H. 104
Stokes Rubber Co., Jos. 97
Stone Paper Tube Co. 99
Synthane Corporation 95

Technical Products Co. 96
Terkelsen Machine Co. 97
Thomas & Sons Co., The H. 81
Mitchell-Rand Mfg. Co. 141
Torrington Co., The 11
Toycraft Rubber Co., The 105

United Chromium, Inc. 14
Universal Winding Company 140

Ward Leonard Electric Co. 98, 112, 116, 126
Waterbury Button Co. 93
Watkins Co., D. M. 141
Wesche Electric Co., B. A. 135
West Virginia Pulp & Paper Co. 137
Western Felt Works 100
Weston Elec'l Instrument Corporation. 10
Wheeler Insulated Wire Co., The 130
Wilcolator Co., The 119
Wilmington Fibre Specialty Co. 103
Wilson Co., H. A., The 135
Wire Stripper Co., The 123
Wolverine Tube Co. 136
Wright Machine Co. 142
Wrigley Brothers 102

Young Brothers Co. 129

Zapon Co., The 93
Zeller Lacquer Mfg. Co., Inc. 136
Zobell Elec. Motor Co. 108

Electrical Manufacturing

1500 YEARS AGO

TAPPING WAS A MODERN ASSEMBLY OPERATION

This golden arm band of the fifth century was joined by a machine screw which fitted into a female thread cut by a tap.

TODAY IT IS OUT OF DATE

FOR HUNDREDS OF ASSEMBLIES

Today the metal working industry has the advantage of a revolutionary improvement. Modern genius has produced unique Screws, so threaded and hardened that they tap their own thread in metal as they are driven. Slow and expensive tapping, for 1500 years necessary to the assembly of metal products with screws, is no longer required for many assemblies.

American industry has been quick to adopt these Self-tapping Screws in place of machine screws. Without sacrificing security of the fastenings more than 50,000 plants have eliminated costly tapping operations and other assembly difficulties through the use of Self-tapping Screws. In the production of almost every kind of electrical product . . . from an attachment plug to a power house panel board . . . these unique Screws are affecting great economies. Savings of thousands of dollars a year are common.

Thousands of wise production heads and designers now try Self-tapping Screws *first* for metal assemblies. You, too, will find it a profitable practice. Check up on your fastening jobs, now. Send a brief description of assemblies for which the Screws may be suitable. We will furnish proper samples for a thorough test.

PARKER-KALON CORPORATION
Dept. K, 190-204 Varick St., New York, N. Y.

THESE UNIQUE SCREWS ELIMINATE TAPPING

HARDENED SHEET METAL SCREWS
For joining sheet metal and making fastenings to sheet metal, aluminum and die castings, Bakelite, etc. Turn Screw into drilled or pierced hole. It taps a thread in the metal. Holds as well as a machine screw

HARDENED METALLIC DRIVE SCREWS
For making permanent fastenings to iron, brass and aluminum castings, steel, Bakelite, etc. Hammer Screw into a drilled or formed hole. It taps a thread in the material, making a better fastening than machine screws.

PARKER-KALON
SELF-TAPPING SCREWS

Patented in United States and Foreign Countries

Electrical Manufacturing

HORSE HEAD *UNIFORM QUALITY* ZINC

FOR DIE CASTINGS

Pencil sharpener die cast from an alloy of Horse Head Zinc . . .

COSTS, TOO, NEED SHARPENING

Die Casting Is A Cost Sharpener. It reduces the number of parts cast . . . it eliminates excessive machining . . . both costly steps in the production scheme . . . . . .

Thus the process. The die castings themselves cast from Horse Head — *Uniform Quality* — Zinc — certify this saving by dependable performance under hard service . . . . . .

THE NEW JERSEY ZINC COMPANY

160 FRONT STREET, NEW YORK CITY

Zinc Metal and Alloys ▪ *Rolled Zinc* ▪ *Zinc Pigments* ▪ *Sulphuric Acid* ▪ *Spiegeleisen*

Ja'33